GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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Editorial Notes.

A Land of Small Gas-Works.

THERE are eighty-five gas-works in Ireland, and out of this number only twenty-six make more than 20 million c.ft. annually. Ireland, therefore, says Mr. W. L. Dalby, in his Presidential Address to the Irish Association of Gas Managers, is in every sense of the term a country of small gas-works. Mr. Dalby's address is published in our columns to-day, and it presents an accurate idea of the state of the gas undertakings in Ireland—an idea which cannot be gained by toying with the published statistics relating to the industry as a whole. Only six works produce over 100 million c.ft. of gas annually; and the real prosperity of the industry is practically confined to these works.

It is to the managers of the small concerns that Mr. Dalby speaks, and he maintains that efforts to increase the use of gas for all purposes must be redoubled. More optimism is needed, and a more vigorous attitude in tackling sales problems and meeting competition from oil and electricity. This competition can be met. As far as lighting is concerned, gas still enjoys a large share of the business in towns where other means of artificial illumination are available; and in regard to cooking and heating, gas stands in a firm position.

Progress will be achieved only by closer co-operation and by a general appreciation that the public pay not for so many cubic feet of gas, but for the service which this gas gives. Thus, though it goes without saying that gas should be sold as cheaply as possible, a low price is in itself no criterion of efficient management. Study of the effect of gas prices indicates that there is no simple relationship between high price and loss of business, and *vice versa*. The public will pay just what a thing is worth.

Leakage and bad debts are two of the topics discussed by Mr. Dalby, in the light of understanding of the irritations to which the small manager is at times subjected. Leakage, he says, is a veritable bogey to some directors and auditors. The latter are often so keen that they exceed their duties of verifying balance-sheets, and launch into detailed reports on matters with which they are not competent to deal. We can well imagine the nature of these discussions, and the difficulty of politely calling attention to "60° Fahr. and 30 in. Hg." The small manager has our fullest sympathy. But we cannot follow Mr. Dalby in his argument that gas lost by slow registration of consumers' meters is lost at its selling price, whereas leakage from pipes is lost only at the cost of making the extra gas, "which is often a trifle." Surely every cubic foot of gas made must bear its burden of every charge on the undertaking, including the capital lying underground. We fail entirely to appreciate the difference between loss through a consumer's faulty meter and loss due to leakage through a joint a hundred yards away from his house.

"We appear," observes Mr. Dalby, "to be extra-"ordinarily immune from losses by bad debts. This "may be due to solvency of consumers in general, "assiduity on the part of collectors, or to stringent re-"striction of credit in doubtful cases; but it rather points "to our business not being carried on in a reasonably "speculative way, and the question arises whether some "of us are not too cautious." There is much point in this idea; but, unfortunately it seems, Mr. Dalby follows up his suggestion by another argument concerning the difference between bad debts due to the sale of coke and those caused by the sale of gas. And here again we find it impossible to follow his line of thought. We have, however, no desire to indulge in criticism, and we hasten to say not only that the address is enjoyable to read, but that it is a valuable review of current conditions in the majority of Irish gas undertakings, and should act as an incentive to better appreciation of the forces of competition and to the formulation of the most desirable methods of overcoming it and of extending the use of gas—Shannon or no Shannon.

Gas and Art.

ALL who visit the exhibition of the work in connection with the Royal Society of Arts Competition for Industrial Designs, which is being held in the Imperial Institute, South Kensington, will gain an insight into the demands of modern poster advertising, and the measure in which these are being fulfilled by aspiring artists. Our first impression was that few of the competitors appeared to realize what was wanted of them, or to appreciate that in the industrial world self-expression of the artist is not considered by business houses as being half as important as the message which they desire the artist to impart. This conception imposes difficulties; but they ought to be overcome by anybody who is intent upon making his or her living as a commercial artist.

A single glance at the disappointing array of posters designed to popularize gas is sufficient indication that the word "gas" does not inspire artistic imagination in any channel likely to be of service to our industry; and the only remedy which we can suggest is more and more educational propaganda. The very few imaginative drawings in the gas section are either doleful or mechanistic, which is a great pity when the outstanding communal aim of the gas industry is to make life brighter—to humanize, not to mechanize. In this section the British Commercial Gas Association very wisely offered a prize of fifty guineas; and the judges, equally wisely, decided that none of the submitted designs for a poster advertising gas was worthy of the full award. Two prizes of ten guineas were given for designs which savour too much of early poster art; they are crude. And we disagree most emphatically with the idea of the judges that the

problem of representing gas as a source of light, heat, and power is a difficult one. In our opinion there is unlimited scope for the exercise of imagination; and the fundamental idea of the artist; before he dips his brush into vivid paint, should be a cheerful one. We say this without qualification; and we suggest that, after examining the posters on gas, the visitor to the exhibition will find a welcome contrast if he studies the posters designed for the Orient Line Mail Steamers to Australia. Even beef suet appears to fire the imagination more than does gas, though in this case the judges maintain that the standard is low.

Our disappointment with the entries was intensified when we examined the designs put forward by competitors for the prize of fifty guineas offered by the British Commercial Gas Association for a design for a fireplace for a room, and for a gas fire of original design for use in connection therewith. Only eleven designs were submitted, and only one seems to exhibit exact knowledge of what a gas fire is. Four prizes were offered by the South Metropolitan Gas Company for a grate front only of original design; a modern fireplace to include a "Metro" coke grate; a self-contained fire for solid fuel incorporating the principles of the "Metro" coke grate; and a basket grate incorporating the principles of a "Metro" coke grate. There were only three competitors; and few people will disagree with the Judges' opinion that the designs show no outstanding originality or artistic merit. Only two prizes were awarded in this section.

As far as gas is concerned, the results of the Competition so admirably organized by the Royal Society of Arts completely vindicate the enterprise of the British Commercial Gas Association and the South Metropolitan Gas Company in offering awards. There is obvious need to encourage our young artists to take an interest in gas, and try to express at least something of the aims of the gas industry. We hope for renewed effort and more pleasing results in 1930.

The Cheapest and Healthiest Fuel.

Considering all that has been, and is being, done to educate the public to the necessity, from a health point of view, of reducing to the lowest possible degree the pollution of the atmosphere by coal smoke, it is somewhat disheartening to come across a printed leaflet—prepared presumably for distribution by coal merchants—claiming that "coal is the cheapest fuel, as well as the "healthiest." The health-bestowing virtues of sunlight are surely universally admitted by now; and the burning of raw coal tends to rob us of this blessing, while the use of smokeless fuels does not. This may be considered a sufficient answer to the second claim. Chief emphasis is, however, laid on the assertion that "coal is the cheapest "fuel," in support of which figures are quoted that are said to be the authoritative results of scientific tests carried out by the Fuel Research Board, as published in Technical Paper No. 12. These "authoritative results" are quoted as follows: "For the everyday comfort of "your home, where you spend 1s. for coal, gas fires cost "quite 2s. 6d., and electric radiators 5s. 6d. or more."

In order to complete the comparison of the costs of the different methods of heating contained in Technical Paper No. 12, which is a report by Dr. Margaret Fishenden, it may be pointed out that these calculations would appear to be based upon a table giving the cost in pence per sixteen-hour day of providing by different means radiation for rooms of different sizes with different numbers of occupants. Thus the figures relate to continuous heating. If this be so, the following qualification, which is printed below the table in the Technical Paper, should be added: "For intermittent heating, however, assuming that the "gas fires or electric heaters are turned off immediately "they are finished with, and neglecting the fact that for "intermittent heating the room temperatures will be lower "than for continuous heating, the cost of gas or electric "heating will be in proportion to the time of operation. "Suppose, for instance, that a room is actually occupied "for only four hours daily, or for one-quarter of the "sixteen-hour day which has been taken, the above "figures for gas or electricity costs must be divided by "four. The cost of gas then becomes little more than "half the cost of coal, and that of electricity about one-"and-a-quarter times the cost of coal."

How often does "the everyday comfort of a home" require the continuous heating of a particular room for sixteen hours a day?

Developing the Coke Market.

The vital importance of coke to the gas industry makes it a matter which must always be kept closely in mind. The possibility of further development of the market is a thing which no gas engineer is in a position to ignore, and therefore any experience in this direction must prove welcome. Various methods are suggested from time to time, some generally applicable, and others devised to meet more or less peculiar local conditions. All schemes, however, must, of course, have as their basis good quality and careful preparation of the coke. These two factors appear among those to which Mr. J. Frank Jones states that the Battle Creek (Mich.) Gas Company, of which he is Sales Manager, largely attribute success in the merchandizing of their coke; and he places them in their correct position of importance—that is, first. The other factors are all worthy of note, and taken together go far to show that the success attained has been thoroughly well deserved. We will give them in Mr. Jones's order, with which we find ourselves in full agreement: Courtesy on the part of drivers and all other employees. Intensive follow-up on all sales, especially new customers. The policy of not increasing prices at any time just because the traffic will bear it. Taking care of old customers first in times of fuel stringency. Gaining the confidence and co-operation of dealers.

The Battle Creek Company claim to have a sale of gas which is double that of most towns of its size; and as all of this gas is made in a coal gas plant, and the increased volume of sales developed very rapidly, the Company were confronted with the disposal of an unusually large amount of coke for a field as small as theirs. It was quickly realized that it was imperative to sell a large amount of coke during the summer months; and a campaign was inaugurated, having for its basis a reduction in the price of coke for summer delivery to $1.50 per ton less than the high point during the previous winter. Anyone ordering on this basis must pay for the coke at the time of delivery; and delivery must be made during May, June, July, or August. After Sept. 1 the price advances at least $1 per ton.

The first year's experience with the summer campaign proved to the Company that they were on the right lines; but twelve months later it was found that many of the customers of the previous year were missing. Investigation showed the necessity of energetically following-up all sales, to see that customers were properly instructed in the use of gas coke, and this the Company believe to have been one big factor in their success. An instruction card was prepared; and it was impressed upon drivers and salesmen that they should fix these cards in some position about the premises where the customers would read them. Advertising in the local papers is maintained the year round; and at the beginning of the summer campaign a circular letter is sent to the entire community, while an additional amount of newspaper advertising is employed. This statement of how Battle Creek has solved its coke problem will doubtless be found to contain hints useful to others.

Second International Conference on Bituminous Coal.

The Proceedings of the Second International Conference on Bituminous Coal held in Pittsburgh last November have now been published in two weighty volumes; and our pages to-day contain a review of Vol. 1, which is concerned for the most part with low-temperature carbonization. Reference is made to the paper by Dr. Jacobus G. Aarts, on "New Aspects of Coal Economy." His revolutionary process for the production of "Carbonalpha" and "Carbonalphine" was the subject of comment in the "Journal" for July 24 last. We hope to publish next week a review of Vol. 2 of the Proceedings.

Mechanical Coal Sampler.

Mr. Charles F. Kingdon has devised an automatic coal sampler which eliminates much of the uncertainty of hand sampling and quartering; and this interesting device is described and illustrated in our columns to-day. It is well known that the difficulties of mixing are great when the particles vary much in size, as they do during the stage-to-stage method of reduction; and consequently there are many chances of introducing errors in the usual hand method of repeated quartering. Mr. Kingdon uses two simply constructed mechanical riffles—one for the coal as it flows from the jaw crusher; the other for dividing the reduced sample after it has been ground to pass a 1/20 in. sieve. The accuracy of these revolving riffles has been recently tested by means of a specially prepared sample, containing 30 p.ct. of shaly coal (about 24 p.ct. ash) between ¼ in. and 1/20 in. in size, mixed with 70 p.ct. of finer coal of much better quality (through 1/20 in. mesh, 10 p.ct. ash). The mixture was passed through the larger riffle, and the 25 p.ct. reduced sample was bottled; then the 75 p.ct. remainder was passed through again, and 25 p.ct. of it was bottled. This was repeated several times until the remainder was about 18 ozs., which was also bottled. The resulting six bottled samples were all ground, reduced in the small riffle, and tested for ash in the usual manner; the results showing a maximum variation of only 0·25 p.ct.

The Numbering of Shares.

Reference has already been made in the pages of the "JOURNAL" to the discussion which has been taking place on the subject of the numbering of shares—a system that is said to entail a great deal of trouble on the Stock Exchange and in transfer offices which might be avoided without seriously increasing the likelihood of fraud. However strong may be the feeling of the individual investor in favour of the existing process, it cannot be denied that things have altered in connection with company administration as in other directions; and a decision must be arrived at by ascertaining on which side the balance of advantage really lies. The chief argument in favour of maintaining compulsory numbering has, of course, been the safeguard it presents against fraud; but, on the other hand, there are equally well recognized disadvantages. With regard to the discussions which have been proceeding between the Stock Exchange, the Institute of Secretaries, and other interested parties, with a view to finding an alternative scheme to the present system of distinguishing shares by numbers, the "Investors' Chronicle" announces that they have now been successful, and that there is every likelihood of an agreed Bill being submitted to Parliament. This will make the insertion of numbers a statutory obligation, in allotment sheets, minutes of allotment, and registers of members, and in all allotment letters, and in every share certificate, scrip certificate, provisional certificate, or other document of title issued by a company in respect of its shares. When this is done, it is proposed that in the case of fully-paid shares the company shall be allowed, if it desires, to discontinue the use of distinctive numbers after they have, in the first place, been given to the shares, subject to safeguards which it is proposed to insert in the Bill. There will be no compulsion on any company to adopt the scheme.

The Meter as a Bond of Union.

Some weeks ago we commented in the "JOURNAL" upon the excellent results that would be likely to accrue to the New Orleans Public Service from the extensive plan which they have recently entered upon, for teaching consumers to read their meters. As was remarked on that occasion, the idea of inducing consumers, as is being done in that case, to concern themselves with their gas meters is one which has always appealed to us; for we cannot see anything but good that is likely to come of it. The advantages of making customers familiar with meter reading have also, we are interested to learn, been recognized by the Portland (Maine) Gas Light Company, who during the last five years have achieved outstanding success in this direction by the use of a postcard which is left by the meter reader at the office or residence of the customer when he is unable to obtain entrance in the usual way. The card, on which is printed a set of meter dials, is as follows: "Our meter reader called to-day, but could not get in. If you will kindly draw on these dials the position of the hands on your meter, your figures will be accepted for calculating this month's bill. Either mail the card or leave it at our office. Read your meters frequently, and ascertain definitely what you are using. Don't guess. We would be glad to have you check these bills as carefully as you do any others." The use of this card has resulted in a splendid feeling of confidence on the part of the Company's customers, and has caused many of them to become regular readers of their own meters to see what they are doing. The plan has reduced the percentage of meters not read to total meters in service at the end of each month from approximately 6 p.ct. to 7 p.ct. down to a little less than 4 p.ct. The June figures were 3·93 p.ct., and a year ago for the same period 3·55 p.ct. These figures are the highest at any time in the year, because of vacations, &c. The percentage has often gone as low as 2 p.ct. since the adoption of this plan. The Company sometimes receive as many as twenty or twenty-five cards in the mail in a day, which, on the basis of 18,000 meters, gives an idea of the extent to which the system is used.

PERSONAL.

Among those recently elected to membership, &c., of the Institution of Chemical Engineers are: Messrs. THOMAS OWSTON WILTON (member), Chemical Engineering & Wilton's Patent Furnace Company, Ltd.; JAMES KNIPES DICKIE (associate graduate), Auchengeich Coke Oven and Gas Supply Plant, Glasgow; ALFRED GEORGE ISHERWOOD ANDERSON, Renfrew Gas Department; LAURENCE WALTER BLUNDELL, M.Sc., A.R.C.S., D.I.C., Gas Light and Coke Company; and JAMES GALLOWAY, Glasgow Corporation Chemical Works (graduates). Mr. CHARLES SWAINSON DAVIES, Chesterfield Gas Department, has been transferred to the class of graduate.

Mr. JOSEPH WILLIAM KAYE, of Bath, who has for the past four-and-a-half years been Works Superintendent at the Pontefract Corporation Gas-Works, has been appointed Assistant Engineer and Manager to the Ascot Gas and Electricity Company, as from Sept. 1.

Mr. F. DOBSON, C.C., Managing Director of Messrs. Renwick Wilton & Co., Ltd., Gas Coal Contractors, has just been appointed a Justice of the Peace for the Borough of Torquay. He is an ex-Chairman of the National Council of Wholesale Coal Traders, and has also just finished his term of office as Chairman of the Gas Coal Section of the Society of British Gas Industries. He is Chairman of the Appledore Gas Company, Ltd., which is being taken over by the Bideford Gas Company.

Mr. THOMAS FRIZELLE, of Holywood, Gas Manager, who died on Jan. 30 last, left personal estate in Great Britain and Northern Ireland valued at £5379.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Sept. 12.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting at St. Andrews.

Sept. 19.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.

Sept. 19.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS.—General Meeting at Porthcawl.

Oct. 4.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—General meeting.

Oct. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Eastbourne.

Gas in the Printing Industry.

Under the title "Gas in Newspaper Printing," the British Commercial Gas Association has published a book which gives a good insight into some of the main operations in newspaper printing. It describes the setting up of the type in the composing room, in machines which are marvels of ingenuity, the melting of the metal, the drying of the matrices from which the curved plates for use on the gigantic rotary printing machines are cast, and the casting of the curved plates, weighing 90 lbs., in a machine called an "autoplate," at the rate of 2½ per minute. The book, which gives the interesting information that all the large London newspapers now use gas for the melting of the metal and for many other operations requiring heat, is illustrated with photographs taken in the printing works of the "News of the World," the "Daily Mirror," the "Daily Sketch," and the new northern daily paper the "Evening World."

SOCIETY OF BRITISH GAS INDUSTRIES.

Meeting of Council.

A Meeting of the Council of the Society of British Gas Industries was held at 56, Victoria Street, Westminster, S.W., on July 31—Mr. C. A. GOODALL, the Chairman, presiding. Those present were Messrs. Frank West (Vice-Chairman), A. B. Balmford, F. J. Gould, R. J. Milbourne, F. C. Tilley, Ernest West, and Major Richard Miles, Col. E. A. Wilson, Dr. E. W. Smith (Hon. Treasurer), Mr. E. J. Davison (Hon. Secretary), and Mr. Arthur L. Griffith (Secretary).

Apologies for absence were reported from Messrs. H. E. Bennet, G. Clark, Samuel Cutler, E. J. Fox, D. M. Gibb, W. J. D. Howell, J. W. Scott, H. M. Thornton, and B. B. Waller.

The CHAIRMAN referred in feeling terms to the death of Mr. T. V. Miles, a Director of Messrs. Newton, Chambers, & Co., Ltd., who had been connected with the Society for many years and served for some time as a member of the Council. Mr. Goodall expressed the sympathy of the members with Major Miles and his family. The members rose in their places as a mark of respect.

Major MILES thanked the members for the sympathy which had been extended to him and his family, which, he said, was very much appreciated.

A letter was read from Messrs. R. & J. Dempster, Ltd., of Manchester, thanking the Council for their letter of sympathy on the death of their Managing Director, Mr. R. A. Hepworth.

An invitation was submitted from the Joint Fuel Committee to join the Committee. The invitation was accepted, and the Chairman, the Vice-Chairman, and the Immediate Past-Chairman were appointed the Society's representatives.

A letter was submitted from the British Commercial Gas Association advising that, owing to the holidays, the Joint Committee appointed to frame terms under which the Gold Medals are to be awarded to the members of the Gas Salesmen's Circles would not meet until about the end of September. This would enable the scheme to be in operation from Jan. 1 next.

An application for membership was considered from Messrs. W. G. Beaumont & Son, Priory Works, Bow, E.; and they were unanimously elected members of the Society under Section 8.

The list of candidates recommended for award of the Society's prizes upon the result of the recent Final Examinations of the City and Guilds of London Institute in Gas-Works Practice, Gas Supply Practice, and Gas Fitting were submitted and approved. The list was published in last week's "JOURNAL."

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

THE increase in the re-discount rate of the New York Federal Reserve Bank came as a severe shock to the Stock Exchange last week; and had it not been for the unprecedented announcement by the Governor of the Bank of England that there would be no immediate rise in the Bank Rate, the result would have been disastrous to the Discount Houses. As it was, stock prices were marked down, and there is considerable anxiety as to the future.

The Gas Market displayed animation, notwithstanding the holiday season, and there were transactions recorded in quite a number of stocks. Commercial ordinary dropped another point on the week. This stock is an attractive purchase at 94, at which price there was one transaction. Imperial Continental ordinary stock recovered the 10 points fall of the previous week, and there were transactions in the Sutton ordinary, which stock rarely comes into the market. Prominence was given during the week to the possibilities of gas companies' debentures, a number of which show attractive yields of from £5 2s. 6d. to £5 5s. p.ct. These stocks should appeal to trustees whose powers of purchase are not limited to trustee securities. The following are worthy of attention: South Suburban 5 p.ct. deb. at 95-98; Tottenham 4 p.ct. deb. at 74-77; South Metropolitan 3 p.ct. deb. at 57-60; and Commercial 3 p.ct. deb. at 56-59. A very attractive yield is shown by the Alliance and Dublin 4 p.ct. deb. at 62-65.

The Maidstone Company's accounts for the year to June 30 show a satisfactory balance of profit, and the Directors are recommending a final dividend of 4½ p.ct., making 8 p.ct. for the year.

The following transactions were recorded during the week:

TUESDAY.—Croydon sliding-scale 110, max. div. 83¾, European 16⅞, Gas Light and Coke 18s. 10¼d., 19s., Hornsey 3½ p.ct. 86½, Imperial Continental 358, 360, 362, 365, Oriental 118½, 119½, South Metropolitan 102, 102¼. Supplementary prices, Sutton 5 p.ct. 116.

WEDNESDAY.—European 17, Gas Light and Coke 18s. 10½d., 19s., 4 p.ct. pref. 75, 3 p.ct. deb. 58, 5 p.ct. deb. 99, 99½, Imperial Continental 358, 360, 361, 364½, 365, Primitiva 35s. 9d., 4 p.ct. con. deb. 81½, 82, 4 p.ct. deb. (1911) 81½, South Metropolitan 102, South Suburban 5 p.ct. 104½, Sutton 116, 117, Tottenham 3½ p.ct. 107½. Supplementary prices, British, Norwich, 3 p.ct. deb. 55.

THURSDAY.—Commercial 94, European 16, 16¼, Gas Light and Coke 18s. 7½d., 18s. 9d., 18s. 10½d., 19s., 3½ p.ct. max. 62½, 3 p.ct. deb. 57½, 58, Imperial Continental 363, 365, 367, 369, 372, 373, 374, 375, Montevideo 105½, Primitiva 35s., 35s. 3d., 35s. 6d., 4 p.ct. deb. (1911) 82, South Metropolitan 101½, 102, Tottenham 3½ p.ct. 107, 107½, Wandsworth "C" 103, 103½, new ordinary 103, 103½, 4 p.ct. deb. 75. Supplementary prices, Southend-on-Sea new "B" 95.

FRIDAY.—Bournemouth 6 p.ct. pref. 11, 11 3/16, 3 p.ct. deb. 54, 4 p.ct. deb. 73, Cape Town 9¾, European 15⅞, 16, Gas Light and Coke 18s. 7½d., 18s. 9d., 18s. 10½d., 3½ p.ct. max. 61, 61¼, 4 p.ct. pref. 74¼, 5 p.ct. deb. 99½, Imperial Continental 362, 365, 369, 371½, Maidstone 5 p.ct. 125, Montevideo 107, Primitiva 34s. 6d., South Metropolitan 101, 101½, 102, 6 p.ct. pref. 106½, South Suburban 5 p.ct. 105½, 5 p.ct. deb. 95, 97½.

In Lombard Street at the week-end money was plentiful; 4 p.ct. being charged for both old and new loans, the rate declining to 3½ p.ct. for new money. The average rate of discount on Treasury Bill allotments worked out at £5 9s. 6·99d. p.ct., or just over 4d. p.ct. above the previous week's rate. Discount rates were firmer in consequence of the rise in the New York rate.

On the Foreign Exchange Market, interest centred in the Dollar-Sterling rate, which receded to 4.84 23/32. French francs fell, and closed at 123.95; German marks closed at 20.36½; and Dutch florins moved against sterling at 12.10½. Pesetas and lira were unchanged at 33.16 and 92.74 respectively, and Belgas were quoted at 34.88¼.

Silver was firm on Chinese purchases at 24¼d. per oz., while Gold was unchanged at 84s. 11½d. per oz.

The Bank Rate is 5½ p.ct., to which it was raised from 4½ p.ct. on Feb. 7. The Banks' deposit rate is 3½ p.ct., and the deposit rates of the Discount Houses are 3½ p.ct. at call and 3¾ p.ct. at notice.

Making and Testing Thermometers and Gas Refrigerator Heat Controls.

The thermometer plays a very important rôle in industrial operations. The reliance that is placed upon it makes it essential that it should be accurate. Hence, every thermometer before it leaves the plant wherein it is made must be tested. Gas is used largely for testing thermometers in the plant of C. J. Tagliabue Manufacturing Co., Brooklyn, N.Y.

Gas is used to attain the desired temperatures for the reason that it is very easily regulated, and a great variety of temperatures can be obtained with its aid. Gas is unquestionably a superior fuel for this purpose, and though its consumption is not high, and the application not of paramount importance to the industrial gas engineer seeking industrial load for his company, nevertheless, there are very few operations in which accuracy of control and flexibility of the gaseous fuel are so much in demand as in this particular instance.

Another very interesting operation carried out in the Tagliabue plant is the manufacture of the heat controls for the "Electrolux" gas refrigerator. The purpose of these devices is to control the operation of the gas-fired refrigerator so that it operates most efficiently and economically. The heat control is, therefore, a very important part of the refrigerator, and hence it must be tested after it is made. Gas is naturally used for this purpose.

It is an interesting commentary on the usefulness of gas that it should be used not only in the production of cold, but in the fabrication and testing of the most essential part of the refrigerator.

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting.

The Annual Meeting of the Association was held yesterday in Dublin, under the presidency of Mr. L. W. Dalby, of the Wicklow District Gas Company. The proceedings commenced with the President's Address, which is published below; and there was a paper on "Salesmanship," by Mr. W. H. Ainsworth, of Manchester, and a debate on problems of particular interest to Irish gas managers. This was followed in the afternoon by a meeting of the Irish District Executive Board of the National Gas Council. The general report of the proceedings will appear later in the "JOURNAL."

PRESIDENTIAL ADDRESS

of Mr. L. W. DALBY, of Wicklow.

My first duty is to thank you for the honour conferred upon me by electing me President of our Association. My year of office has, I am pleased to say, been marked by no great upheaval in the political or industrial worlds, so that we have been able to pursue our business peaceably. It is customary for the President of our Association to survey the condition of the gas industry in Ireland, and I shall therefore set before you a number of points dealing with our present situation, which, I hope, will be worthy of your consideration.

To take the latest published figures relating to the production of gas, number of consumers, &c., for the whole of Ireland would lead one to believe that our business is in a flourishing condition generally, and certainly the bare totals given in the returns available support that conclusion. While this is true of a large part of the industry, there remains a section where conditions are anything but good, and need our earnest consideration with a view to finding a remedy.

PROGRESS OF GAS IN IRELAND.

I have taken out figures showing the progress of the industry in Ireland, and have adopted the year 1914 with which to compare the last published figures for 1928. We all know, only too well, how much this country has suffered since the commencement of the world war and during the internal troubles following it, which hindered our progress up to the last few years. In Great Britain rapid expansion was going on while we stood still, and, in some cases, unfortunately, lost ground.

It is a melancholy fact to note that 25 gas-works, supplying over 4000 consumers with upwards of 90 million c.ft. of gas per annum, have closed down since 1914. Of these 25, nine at least were closed down owing to want of capital to pay for coal during the war. I admit that most of these works were small, ranging in output from 9 to only 1 million c.ft. per annum; but when one considers that out of 85 works in this country only 26 make more than 20 million c.ft. annually, it will be conceded that this is a country of small gas-works in every sense of the term.

The real prosperity of the industry in this country is almost confined to the six works now producing over 100 million c.ft. per annum. In the past fourteen years these few works have increased their output by 51 p.ct., and, while the total increase in the number of gas consumers for the whole country has been about 40,000 in the same period, approximately 30,000 of the increased figures are accounted for by these works alone; of these again almost 80 p.ct. is to the credit of Dublin and Belfast.

I can almost hear the gentlemen before me saying "figures can be made to prove anything," but it is well to consider such matters, and I do not do so in a pessimistic spirit. My object is to make our position as plain as possible, and to urge the managers of the smaller works in particular to redouble their efforts to increase the use of gas for all purposes. This point I shall refer to later.

Turning to the returns for works producing from 50 to 100 millions per annum, I find the average increase (1914-28) has been only 21 p.ct. Of these works we have only seven in Ireland. The thirteen works producing from 20 to 50 millions annually show an improvement of 13 p.ct. Those from 10 to 20 millions—fourteen works—have a rather better figure of 20 p.ct. to their credit, while the fifteen works which produce from 6 to 10 millions each year can only show an increase of 5·7 p.ct.

THE SMALL WORKS.

We have now to consider the case of the thirty works whose annual make is less than 6 million c.ft. per annum; and I wish to impress upon you that works of this size are, as the figures show, more numerous than we generally realize. I have divided this group into two parts, and I find we have 23 works with a make of only from 3 to 6 millions per annum, and seven which make less than 3 millions. The first-named have lost 16 p.ct. of their business during the period under review, and the remainder are down by 25 p.ct.

Speaking generally, I find the Northern works have improved their position very materially since pre-war days. In many ways they are in an atmosphere more favourable to gas than we in the South, and they have taken full advantage of the fact.

To return to the consideration of the general progress made, we must regard the increased business as, on the whole, satisfactory. It is better than one might expect when taking into account the high prices which we were compelled to charge during the years when conditions were dead against all progress. I am inclined to think that consumers use just that amount of gas they require, regardless of price.

The adoption of the Summer Time Act, the shorter hours now generally observed by shopkeepers, and the fact that we now use standard Greenwich time all the year round have greatly reduced the number of lighting hours for both public and private lighting. These factors alone mean a very large reduction in our lighting load.

THE PRESIDENT,

W. L. Dalby, of Wicklow.

Mr. Dalby entered the gas industry when he joined the staff of Messrs. Anderson Brothers, of 5, Victoria Street, S.W. 1 (the well-known Consulting Gas Engineers), in June, 1909. In 1913, he took up a post as Assistant at the Kilkenny Gas-Works. In 1914, he took charge of the Bagenalstown Gas-Works, and later became Manager at Westward Ho! After serving some time in the Royal Air Force, he was appointed, in August, 1919, to his present position of Manager of the Wicklow Gas-Works. He is a Member of the Institution of Gas Engineers, and has represented the Irish Association of Gas Managers on the Council of that Institution for the past year.

The general average is also much affected by the losses sustained by works which formerly had the benefit of the large consumption of military barracks. In some cases this formed half their total output of gas. Furthermore, the troops stationed in those towns used to spend huge sums locally, and also some Government supplies were obtained there. All this money has been lost to the shopkeepers, who naturally are forced to economize in every direction, including the use of gas.

There is the loss, too, which may be attributed to the numerous electricity undertakings started since the war years. One

works, which had a make of 56 millions in 1914, was reduced to 34 millions by 1917 owing to municipal electrical competition, but since that time has again increased its load to 44 millions by slot and cooker installations. I hope this loss is only a temporary set-back, as the provision of such luxury lighting (it is a luxury in small towns) leads to a spending spirit which reflects itself in the increased use of gas for other purposes. The general standard of comfort is higher than in pre-war days, and any means which lead to increased comfort and leisure are now eagerly sought after.

Price of Gas.

Excluding those works now supplying over 40 millions per annum (of which there are not many, as we have seen), the average price of gas pre-war was approximately 4s. per 1000 c.ft. The price received by those works to-day averages about 7s. 9d.—a rise of 93 p.ct. This rise is much less than the increased cost for wages, coal, and other commodities, and suggests that profits earned have been materially reduced, after allowing for more efficient working.

The variations in the increases in different works are very great. Some works are actually receiving a lower price than pre-war. On the other hand, two works are receiving more than double their former figures. There is no general percentage increase. Very few works appear to make a large difference in price where differential prices are charged.

When one considers prices it is clear that the biggest increment in price in no way synchronizes with the greatest loss of consumption, and, *vice versa*, the lowest increases in prices do not run together with the greatest increases in sales. One is forced to the conclusion that small reductions off high prices do not stimulate sales.

Coal and Coke.

The rise of cost of coal into store since the war averages about 68 p.ct. The rise would have been far greater were it not for the depressed state of the sea-freight market. Freights are only about 20 p.ct. more than pre-war.

Excluding the works which make over 100 millions per annum, I find the industry carbonizes about 110,000 tons of coal each year. Would it not be possible to combine for the purpose of buying our coal? Co-operation in this matter should be of great benefit to all, and, I think, is worthy of consideration.

A most extraordinary change has taken place in the selling prices of coke. Pre-war the net amount received per ton used to approximate very closely to the costs per ton of coal. In recent years, the net amount received per ton of coke has been much in excess of the cost per ton of coal. In many works the difference is about 4s. to 5s. and in some even 12s. to 15s. This disparity is very general throughout the country and is likely due to an awakening which happens in the time of adversity.

Seaport towns are apt to suffer from the competition of coke imported very cheaply from cross-channel. Merchants buy at a very low figure, and when they are able, as some are, to carry cargoes in their own ships, they can afford to sell at a price which seriously affects the position of a small gas-works.

Tar.

The smaller works appear to dispose of their tar locally on terms favourable to themselves, but the larger works find some difficulty in disposing of this. I am of the opinion that if a stronger effort had been made by the large distillers of tar to meet the Government's demand, far more of the home production would be used for Irish roads.

Unaccounted-for Gas.

Leakage is a veritable bogey to some directors and auditors. The latter are often so keen that they exceed their plain duty of verifying the balance-sheet, and make reports upon details of management with which they are not competent to deal. Leakage is one of the things they think they understand, and often, through drawing the attention of directors to it, land the unfortunate manager into hot water. Leakage should be kept as low as reasonably and economically possible; but it is not nearly so important as most directors and some managers think.

The word "leakage" is generally used to cover all unaccounted-for gas and so includes the loss by slow registration of consumers' meters. This is a very different matter, as gas lost through non-registration of meters is lost at its selling price, whereas real leakage from pipes, &c., is only lost at the cost of making the extra gas so lost, which is often a trifle. The sale of residual coke and tar, from the coal so used, almost covers the actual cost of the unaccounted-for gas in many cases. Thus it is rarely an economical proposition to spend large sums of money in attempting to trace small losses.

Meters.

Since the war the costs of meter repairs have increased enormously. Many undertakings show expenses under this heading which are double the former figures, and in some cases the extra costs have been five-fold. These increased figures are due to various reasons, the greatly increased charges by repairers being the primary cause. During the war period and after, much inferior material was used, resulting in repaired meters soon proving defective. The high cost of repairs has led to much scrapping of old meters and their replacement by new ones—again a costly matter.

When you consider that to overhaul a meter thoroughly and put in new leathers costs practically two-thirds the price of a new meter, it is doubtful if repairs are worth doing, as you are left with a second-hand meter carrying only a two-year guarantee at two-thirds the cost of a new one, which latter is guaranteed for five years. The difference in the period of guarantee points to about 40 p.ct. of the cost of new meters as being the limit worth paying for repairs to old ones.

We are now compelled—by the Act of last year—to have all our meters, which do not bear the Free State seal, re-stamped within five years of the date of that Act. This is likely to prove a serious burden to many of the smaller works, and is an expense which even the more prosperous undertakings would be glad to avoid.

Some works have a large number of meters already bearing the Free State seal. This is due to the general work of replacing defective meters referred to earlier. Where this work has not been going forward, the effect of a complete overhaul within the next few years may actually be a direct benefit to the works concerned, and so pay handsomely in the long run.

While on the subject of meter stamping, it is interesting to recall that electrical undertakings are under no liability to have their meters either tested or sealed officially. This is a point which our friends in Parliament might well consider worthy of notice.

Cookers.

Since the war, many undertakings have greatly extended the number of cookers in use on their districts, and it has proved their salvation. They are now provided with a good cooking consumption, used through economical cookers of modern design. The great improvement in design in late years has been most marked. Many works had less than 30 p.ct. of their consumers using cookers before the war. On the other hand, there were companies which embarked on the cooker campaign earlier, and had up to 60 p.ct. of their consumers with cookers at that time. Now they are paying the penalty of forging ahead—ahead of their time. They have now little scope for introducing cookers of modern design, and are landed with a load of rather antiquated cookers still too good to scrap. We are still waiting for a really cheap cooker suitable for free fixing but capable of standing up to hard work for a reasonable working life.

Rates.

Since the war, there has, in many cases, been a great increase in the amounts paid for rates by gas undertakings. Several are paying twice as much as, and some nearly three times, the former amounts. The cost of rates works out on an average to about 2½d. per 1000 c.ft. sold, which, of course, gas consumers have to pay through their gas accounts to the local authorities, in addition to the rates they pay directly, in respect of the premises they occupy, to the same authorities. It is a heavy burden, and companies would be wise to have their valuations scrutinized by experts and endeavour to have them revised if excessive. Several companies who did so have secured relief, resulting in their rates having hardly increased at all since the war, and, in some cases, actually decreased. The Commissioner for Valuation has recently received rebuffs in the law courts, and valuations scrutinized now may be drastically cut down to the benefit of gas consumers.

Bad Debts.

We appear to be extraordinarily immune from losses by bad debts. This may be due to solvency of consumers in general, assiduity on the part of collectors, or to stringent restriction of credit in doubtful cases; but it rather points to our business not being carried on in a reasonably speculative way, and the question arises whether some of us are not too cautious. Directors of gas companies—men who are usually engaged in ordinary trade—seldom realize the nature of bad debts in our business, and are generally prone to find fault if such be incurred, which is very discouraging to a manager.

Let us consider how bad debts vary, and contrast (say) a bad debt for a coke account and one for a gas account. In the case of coke, if a debtor does not pay, you lose the full value of the coke, as you might have sold it to someone else for the same money. In the case of gas, if a debtor does not pay, you lose only the cost of producing the gas made for him—his taking the gas did not prevent you selling it elsewhere, because you simply would not have made it. Now, the cost of that extra gas made for the debtor was very small compared with the final price charged to him. For instance, gas charged to him at 5s. per 1000 c.ft., likely cost at the outside only 6d. per 1000 c.ft. at the producing stage. Thus if you make a bad debt of £50 for coke, you lose the full £50, but if you make a £50 bad debt for gas, you really lose only £5.

Consider a gravitation water company making a £50 bad debt. It would not lose £50, but merely the value of the water, which would have flowed over the weir had the debtor not taken it; and that value was practically *nil*. Hence, while

we should be very careful in giving credit for coke, &c., we should be prepared to take risks in the selling of gas. If we do not, we are likely to restrict our output unduly.

There are instances of large consumers getting into "Queer Street," and their ability to pay being doubtful. They have not been cut off, but their accounts have been watched, and possibly monthly payments on account collected, so as to keep the debt from materially increasing. Some got over their difficulties, paid up all arrears, and continued as consumers. Others struggled on for a few years, ultimately failed, and let the gas companies in for bad debts; but while they were carrying on, with the chance of making good, they used gas yielding a profit ten times the amount of the loss. Some managers, in fear of their directors, would have cut off such consumers as soon as they got into difficulties, thus losing the profits on subsequent sales.

Competition.

During the period under review many gas managers have been faced with competition from electricity for the first time in their experience, and the advent of the modern oil cooker also provided a competitor which had to be met. It says a great deal for the merits of our product to find that we still hold a very large share of the lighting business in those towns where other means of artificial lighting are available, and, after a few years' experience of oil cooking, it is gratifying to see consumers reverting to the use of gas for that purpose. I have had the pleasure of replacing many oil cookers in my district with modern gas cookers, during the past year or two; and I am sure other managers could tell the same story.

Now that the Shannon Electricity Scheme is so far advanced, many of our members will soon be faced with competition from it. Some gas undertakings are bound to suffer considerably at first, but the high charges which must be made generally to ensure the solvency of the scheme as a whole will deter many who might otherwise be disposed to adopt electricity for lighting. We need not fear serious competition for heating and cooking, &c., as even the smallest gas companies can compete favourably for this business. I would impress upon all the necessity of pushing business in cooking and heating, for we must rely on such business more and more in the future.

The introduction of automatic gas oven control by all the leading makers has proved a valuable asset. My experience is that my consumers now demand a stove having this feature, and are not to be persuaded to buy any other type.

Gas apparatus for water heating has also been brought to an advanced state, and it is now possible to obtain a very fine type of combined circulator and storage cylinder at a price within the reach of all who have use for an installation of this kind. From our point of view, it possesses the advantage that no change need be made in the capacity of the service or meter, as the gas consumption is only a few cubic feet per hour at the maximum. Formerly, the lack of such a convenience to do the work of water heating in the summer months prevented many prospective consumers from installing cookers. The ordinary geyser did not always fill the need, though it can still be recommended in many cases, and is a great boon.

Gas Fires.

The modern gas fire deserves more consideration from our consumers than it has obtained up to the present; and here again we have a large field open to us for cultivation. Even where the price of gas is high, a modern gas fire will give great satisfaction at a reasonable cost for use in dining-rooms or bedrooms, where they are only needed for short periods during the day and night. I need not quote the many advantages gas fires possess over the commonly used coal grate of to-day, as you are well aware of them; the point is never to lose an opportunity of impressing your knowledge upon your consumers. The latest improvement in the material used in the manufacture of gas fire radiants will be a further help to us in obtaining new business. Exhaustive tests have proved that the new radiants are superior to the old in every way. The heat can be more pleasantly borne, and the general sense of comfort is increased; also, a fire fitted with them is of a brighter appearance than the old, and heats up more rapidly.

My experience has been—and I think it is general—that, for lighting, a certain class of consumer will have electricity at any cost, and we must be prepared to meet the loss of a part of our lighting load by extending sales in other directions. There still exists an enormous field for gas as a fuel, and it is up to us to secure it.

More Optimism Needed.

One meets many people, ill-informed, who are inclined to consider gas as a back number, and who regard our complete extinction in this country as inevitable. Perhaps we are ourselves partly to blame for this idea. We are all far too modest as to the merits of gas, and very few, outside the industry, really appreciate what gas can do for the community if it gets a fair chance of showing its worth. We should adopt a far more aggressive attitude and indulge in a little boosting of ourselves and the industry we serve. I believe that if we did this we should rise considerably in the estimation of the public.

I should like to say to those of our members who naturally feel a little uneasy of the prospects before them: Do not be unduly pessimistic of your future. It is disheartening to watch the lighting load being gradually taken from your business, as I myself have experienced, but you will find compensation in other directions. Actually the sales of gas in my town are now slightly better than before the supply of electricity commenced there nearly six years ago, and I have every hope that we shall show increased returns year by year.

In conclusion, I wish to thank those members who so kindly supplied me with the information asked for in my questionnaire sent out earlier in the year, and which proved a great help to me in the attempt I have made to put our present position as an industry before you.

THE CARBON MONOXIDE QUESTION.

By Dr. Harald Kemmer, of Berlin.

[Abstract Translation from "Das Gas- und Wasserfach," July 27.]

(*Concluded from p. 299*)

Catalytic Processes.

The second main group of processes for the extraction of carbon monoxide from town gas must now be considered. These are the catalytic, or so-called contact, methods, by which the carbon monoxide, with the help of so-called catalysts, are either reduced by hydrogen, or oxidized with water vapour to carbon dioxide and hydrogen. This catalytic reduction of carbon monoxide has received increasing attention in recent years through the so-called methanol synthesis of the Badische Anilin und Soda Fabrik, the synthol process of Franz Fischer, and generally as a suggested solution of the carbon dioxide problem in connection with gas supply. The present study would therefore be incomplete without some reference to the details of this interesting reaction.

In their classic work, Sabatier and Senderens showed that carbon monoxide, which presents great difficulty as regards its direct reduction with free hydrogen, is easily converted into methane in the presence of suitable catalysts, and in particular nickel, according to the reaction

$$CO + 3H_2 = CH_4 + H_2O \text{ vapour} + 50{\cdot}3 \text{ k.cal.}$$

They further observed that the complete process of this reaction is influenced by certain minor reactions, especially the splitting of the carbon monoxide according to the equation

$$2CO = CO_2 + C + 38{\cdot}8 \text{ k.cal.}$$

Mayer and Henseling found that methane can also be formed from the elements carbon and hydrogen according to the equation

$$C + 2H_2 = CH_4 + 22{\cdot}1 \text{ k.cal.},$$

and they recognized that, for the complete reduction of the carbon monoxide in practice, four to five times the volume of hydrogen must be used; while Mayer and Altmayer, and Mayer and Jacoby, studied the course of the reaction and the methane equilibrium.

From the graph of the methane equilibrium shown in fig. 1, it is seen that the splitting of the methane into carbon and hydrogen begins at 300° C., and is practically complete at 1000° C. Very soon after the publication of these studies, Williamson and Elworthy and Sabatier and Senderens tried to perfect a technical process for the reduction of carbon monoxide, with the idea of producing high-calorific gases containing methane from gases such as water gas, which contain a high percentage of carbon monoxide. At that time, however, technical and commercial difficulties intervened.

Little further progress was made with the methane problem until the Cedford patented gas process in 1910, in which, starting with water gas, the necessary 1 : 5 carbon monoxide-hydrogen proportion was reached by taking the carbon monoxide from the water gas by condensation according to the Linde-Frank-Carosch principle until the correct mixture was achieved. The gas mixture was then introduced into the reaction tubes for the reduction of the carbon monoxide to methane, while the superfluous carbon monoxide was used for

power production. Unfortunately this process also got little beyond the very early stages.

TESTS WITH VARIOUS CATALYTIC AGENTS.

The author himself, in the years 1922 and 1923, investigated the possibility of the conversion of the whole of the carbon monoxide to methane according to the theoretical 1 : 3 proportion of carbon monoxide to hydrogen, by using suitable catalytic agents with lower reaction temperature and the avoidance as far as possible of secondary reactions. A few of the results may be quoted in explanation of what takes place in the synthesis of methane.

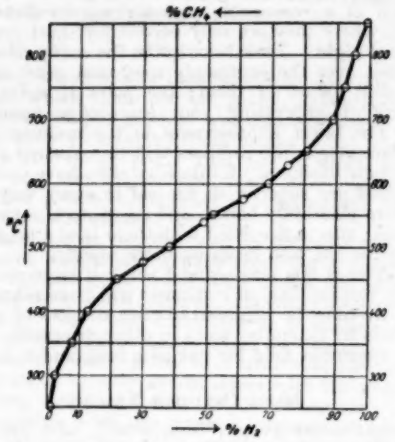


Fig. 1.—Methane equilibrium according to Mayer and Altmayer.

From fig. 2 it is seen that the carbon monoxide reduction takes place at much lower temperatures, and, in the absence of secondary reactions, a higher methane content is obtained, when a catalyst is used in which the nickel is deposited on activated carbon of special surface instead of on clay sherds. The methane production rises practically vertically to a maximum within quite a few degrees of temperature, to fall again as the secondary reactions set in. Using a 1 : 5 mixture of carbon monoxide and hydrogen, the whole of the carbon monoxide was reduced to methane. As special advantages of this catalyst, it may be mentioned that it is less sensitive to contact poisoning, and that a smaller quantity of nickel is required, which, of course, is of considerable importance in connection with the rendering non-poisonous of town gas.

Fig. 3 shows the reaction of the carbon monoxide and carbon at various temperatures. It drops very rapidly to *nil*, while the methane-carbon rises equally fast. At the same time, but in quite small quantities, there appear carbon dioxide-carbon and amorphous carbon as waste.

Fig. 4 shows that the use of well-equipped catalysts, in which thorium oxide and nickel were blended in varying proportions, reduced the reaction temperature by some 100° C., and effected an almost complete reduction of the carbon monoxide even with the theoretical carbon monoxide-hydrogen proportions. With catalyst *c*, the maximum methane production took place as low as 180° to 190° C. Further details cannot be given here of the very interesting reactions which took place with these catalysts, but it may be mentioned that even heavy hydrocarbons were formed in small quantities in addition to methane.

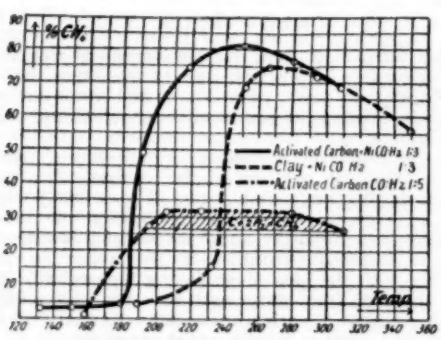


Fig. 2.—Methane synthesis from CO and H_2.

These few details will perhaps suffice to show that scientifically the reduction of carbon monoxide is a proved process. From the practical and commercial aspects there is at present little that can be said, as there is nothing upon which to base even an estimate of capital and working costs. In its favour may be mentioned that the temperature of the reaction is so comparatively low that it is maintained by the heat development of the process itself, once the apparatus has been warmed up. On the other side, however, is the fact that the contact poisoning and fouling of the gas must first be removed by low-temperature cooling.

THE EFFECT UPON TOWN GAS.

It is necessary next to consider what effect the hydrogenation of the carbon monoxide would have upon the nature of the gas, its analysis, calorific value, and density. Table 4 shows that the changes would be extensive. The calorific value of the original gas, for instance, would be raised from 4290 k.cal. per cub.m. [480 B.Th.U. per c.ft.] to 7240 k.cal. [810 B.Th.U.], and the density raised to 0·718. Hydrogen would be reduced from 50·0 to 6·5 p.ct., while methane would increase from 18 to 62·7 p.ct. The loss of energy would amount to about 9·7 p.ct.

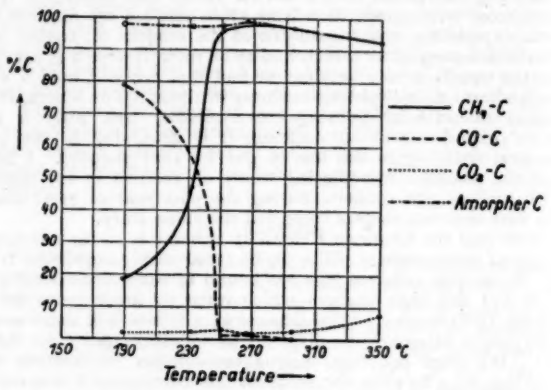


Fig. 3.—Conversion of the CO-C in the synthesis of methane.

TABLE 4.—*Effect of Hydrogenation upon the Gas.*

Original Town Gas.	After Hydrogenation.	Corrected by Addition of CO_2/H_2 Mixture of Gross C.V. 250, Density 0·43.
CO_2 = 4·0	7·5	..
C_mH_n = 2·5	4·7	..
CN = 15·5	..	..
H_2 = 50·0	6·5	..
CH_4 = 18·0	62·7	..
N_2 = 10·0	18·6	..
Cal. val., gross 480	810	480
,, ,, net 430	730	..
Density, 0·48	0·718	0·55
Loss of energy	9·7 p.ct.	9·7 p.ct.

It is quite obvious that such gas could not be sold as it is, and, to produce something to satisfy modern requirements, the hydrogenated gas would require an addition of something like 60 p.ct. of a carbon dioxide-hydrogen mixture with a calorific value of 2280 k.cal. [255 B.Th.U.] and density of 0·43, so that a gas of 4270 k.cal. [480 B.Th.U.] would result, with a density of 0·55. This mixture would have to be added before the reaction, in order that traces of carbon monoxide remaining from the treatment of water gas with steam, which would be the easiest way of producing the required gas mixture, might be finally removed. Dilution with inert gases only would pro-

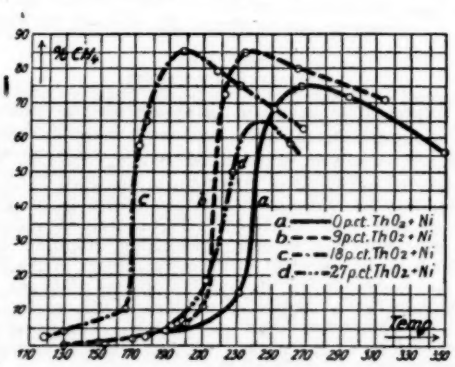


Fig. 4.—Influence of the relative ThO_2 content on the reaction temperature.

duce an unusable mixture having a calorific value of 5300 k.cal. [595 B.Th.U.] and a density of 0·8.

TABLE 5.—*Effect of Hydrogenation upon the Gas.*

Original Town Gas.	After Hydrogenation.	Corrected by Addition of CO_2/H_2 Mixture of Gross C.V. 220. Density 0·57.
CO_2 = 3·0	4·1	19·0
C_mH_n = 4·0	5·5	2·6
CO = 9·0	..	..
H_2 = 48·0	28·8	47·6
CH_4 = 28·0	50·6	23·8
N_2 = 8·0	11·0	7·0
Cal. val., gross 595	780	480
,, ,, net 530	700	425
Density, 0·46	5·49	0·53
Loss of energy	4·4 p.ct.	4·4 p.ct.

The hydrogenation of the straight coal gas shown in Table 5 would give a better result, and a satisfactory final result could be obtained by mixing 47 p.ct. of the hydrogenated gas with 53 p.ct. of a mixture composed of 32·2 p.ct. carbon dioxide, 64·3 p.ct. hydrogen, and 3·5 p.ct. nitrogen.

Summarizing these results, it can be said that the removal of carbon monoxide from modern gas by means of hydrogenation would at present lead to great difficulties owing to the very considerable raising of the calorific value.

ANOTHER CATALYTIC METHOD.

A second possible method of employing catalysis for the removal of carbon monoxide is by its reaction with water vapour according to the so-called water gas equilibrium

$$CO + H_2O \text{ vapour} = CO_2 + H_2 + 10{\cdot}6 \text{ k.cal.}$$

As already mentioned, the Badische Fabrik employs this reaction on a large scale for the production of the nitrogen-hydrogen mixture used for the synthesis of ammonia by the Haber-Bosch process. Iron with chromium oxide is used as catalyst. The reaction is best at 500° to 550° C., but the necessary temperature in this case has to be supported from external sources, since comparatively little heat is generated by the reaction. The great advantage of this process for the treatment of town gas would be that the loss of energy is theoretically *nil*, and in practice it would be only very small, and that the resultant gas would require little or no correction for public supply. The effect upon our ordinary town gas is shown in Table 6, as before. The effect of the complete absorption of the carbon dioxide as well as the monoxide is also given. It would be better in practice to leave the gas with some 5 p.ct. of CO_2, which would give it the more convenient density of 0·35.

TABLE 6.—*Removal of Carbon Monoxide by Reaction with Water Vapour.*

Original Gas.	With CO Removed.	With CO and CO_2 Removed.
CO_2 = 4·0	16·9	..
C_mH_n = 2·5	2·2	2·6
CO = 15·5	..	..
H_2 = 50·0	56·7	68·2
CH_4 = 18·0	15·6	18·8
N_2 = 10·0	8·6	10·4
Cal. val., gross 480	420	500
,, ,, net 430	365	440
Density, 0·48	0·5	0·29
Loss of energy	0 p.ct.	0 p.ct.

The straight coal gas shown in Table 7 could, as regards calorific value and density, be supplied without further treatment after the removal of the carbon monoxide.

TABLE 7.—*Removal of Carbon Monoxide by Reaction with Water Vapour.*

Original Gas.	With CO Removed.
CO_2 = 3·0	11·0
C_mH_n = 4·0	3·7
CO = 9·0	..
H_2 = 48·0	52·8
CH_4 = 28·0	25·7
N_2 = 8·0	7·3
Cal. val., gross 595	545
,, ,, net 530	485
Density, 0·48	0·47
Loss of energy.	0 p.ct.

There are, however, difficulties in the way of the application in practice of this reaction. As is seen from fig. 5, the quantity of carbon monoxide contained in the final gas is greatly dependent upon the excess of steam. Only at about 100-fold excess would the whole of the carbon monoxide be converted, and at this rate the process could never be used commercially in gas-works. Even at 30-fold excess of steam, which still leaves 1·5 p.ct. of carbon monoxide in the gas, the cost of steam would work out at something like 6d. per 1000 c.ft. of gas treated. If the carbon monoxide has to be entirely taken out, it seems that a second process, preferably the hydrogenation method, would have to be used as well. This would mean the employment of a combination contact process, by which primarily part of the carbon monoxide would be converted into carbon dioxide and hydrogen by means of the theoretical quantity of steam, and secondarily the 4 p.ct. remaining would be converted into methane. A combined process of this nature would have much in its favour, for, as already shown, the gas after hydrogenation of the carbon monoxide would require correction by the addition of a carbon dioxide-hydrogen mixture, so that in any case both processes would have to be gone through more or less.

Summarizing the various catalytic processes, it is impossible to say which, if any, will prove to be the ultimate solution of the carbon monoxide question, and only a complete series of systematic tests on a fairly large scale can advance the present state of knowledge on the subject. At the present stage, it is quite impossible to give any data bearing on capital or working costs, or any estimate of the effect upon the cost of gas production.

LIQUEFACTION AND FRACTIONAL DISTILLATION.

One more method of rendering town gas non-poisonous must be considered—namely, purification by the physical means of liquefaction and fractional distillation of the gases freed from carbon monoxide and of the carbon monoxide. The process consists, broadly speaking, of withdrawing from the gas the vaporization heat of the liquefied and boiling nitrogen produced according to the Linde principle until it reaches a temperature at which the carbon monoxide separates out in liquid form. Working at a pressure of 10 atm., this temperature is −161° C., and at 25·7 atm. it is −145° C. The portions of the treated gas which still remain in gas form are used for pre-cooling, on the counterflow principle, the gas still to be treated, and are themselves warmed-up in the process. Several fairly large

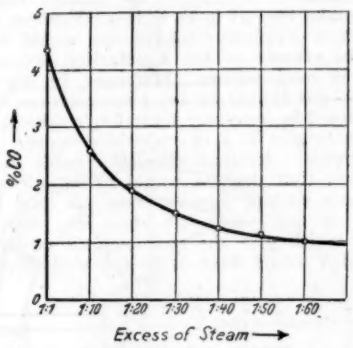


Fig. 5.—Dependence of CO content in treated gas upon excess of steam.

plants are already in existence, either for the production of pure hydrogen from water gas or coke oven gas for ammonia synthesis, or for the breaking-down of coke oven gases with the object of distilling out so-called rich gas for long-distance supply purposes. There is a plant of the kind at the colliery of the Rombacher Hüttenwerke. Details of the process have been published in the past by Bronn and Borchardt.

AN ESTIMATE OF COSTS.

The gas purified of carbon monoxide by this method would be very similar to that resulting from the copper formate absorption process (see Tables 2 and 3). The effect upon the final cost of production of the town gas can be estimated with at any rate some degree of accuracy. In the following attempt, costs are for a normal gas, which has been subjected to the usual wet and dry purification processes. The capital cost of plant for a 3½ million c.ft. make, including a 33 p.ct. reserve, would, on the maker's estimate, be £66,650. Including 18 p.ct. for interest and amortization, and taking round figures for electrical energy, labour, water, lubrication, &c., and for the 11 p.ct. loss of energy of the gas, with a credit for the value of carbon monoxide recovered and consumed in producers, the net cost per 1000 c.ft. of gas treated would amount to approximately 6d. This figure, of course, can only be regarded as a rough estimate. It is at any rate lower than that arrived at for the absorption processes.

SUMMARY.

In summarizing, the author considered that the question of the carbon monoxide in gas can be answered as follows. Its removal is undoubtedly technically possible by

1. Absorption with ammoniacal copper formate solution under pressure.
2. Catalytic hydrogenation to methane.
3. Catalytic combustion with steam to carbon dioxide and hydrogen.

These two catalytic processes could well be combined, so that

by the hydrogenation a usable gas may be produced, and by the steam reaction a gas entirely free from carbon monoxide.

4. Liquefaction and fractional distillation of the carbon monoxide.

The characteristics of modern town gas can be very accurately restored after the removal of the carbon monoxide by the use of certain diluent gases, which would obviate any alteration to existing appliances. As between the possible processes, there can be no doubt that cost would eventually be the deciding factor, as very little, if any, of the additional expense could be passed on to the consumer. As far as can be deduced at present from known facts, the liquefaction process has the advantage. But it is abundantly clear that the problem of rendering town gas non-poisonous is still fraught with great, if not insurmountable, difficulties, and that very extensive and costly experiments will have to be undertaken before it can be solved to the satisfaction of both interested parties—the consumer and the producer.

POINTS FROM THE DISCUSSION.

Some interesting points were brought out in a discussion on the paper initiated by Dr. Bunte, of Karlsruhe, who remarked that Dr. Kemmer had very appreciably advanced the hydrogenation process by means of his new catalysts. The critical point to him seemed to be whether even the smallest increase in the cost of gas production would not in many cases put it out of competition with solid fuels, and whether it was worth sacrificing the hygienic and many other advantages of gaseous fuel to the fetish of "non-poisonous" gas. Another point worth stressing was that any process to be acceptable to the industry must be capable of adoption on a small scale as well as a large, for, once the new gas was supplied in one place, the demand for it would no doubt be universal.

The important question was raised by another speaker as to the effect on the odour of gas of removing the carbon monoxide. Dr. Kemmer expressed his opinion that the result would be to make the gas more or less odourless, as the strong smelling organic sulphur combinations would be either destroyed by the contact or the liquefaction process, or would be removed by condensation. Moreover, he did not consider that odourless gas should in any circumstances be offered for sale, and it would be necessary for safety's sake by some subsequent process to give it a characteristic odour. Dr. Bertelsmann, of Berlin, declared himself unable to share Dr. Kemmer's view that the gas would be odourless, for, in the low-temperature cooling process, only the total hydrocarbons are liquefied at first, and with them the mercaptanes and mercaptides, which give the characteristic odour to the gas. The liquefaction would have to be followed through fractionally, as naturally the high-calorific hydrocarbons could not be lost with the carbon monoxide. In practice, the hydrocarbons would have to be kept separate, and then the carbon monoxide fractionated separately, and the hydrocarbons, including the mercaptanes and mercaptides, subsequently restored to the gas. In reply, Dr. Kemmer said that the speaker had misunderstood him. He had stated that, regarding the processes generally, they would have to reckon with a more or less odourless resultant gas, by which he left open the question as to what means should be employed for giving it again a certain odour. It was, in effect, a matter of minor importance. With the cooling and fractional distillation process they could, of course, return to the gas the condensed organic sulphur combinations. Whether or not this would be the best procedure could be left for decision at a later stage. He remembered, for instance, that in one works in England they even took the trouble to eliminate as far as possible the organic sulphur combinations by the Carpenter process. With the catalytic processes other methods would have to be adopted, since the catalysis would destroy the organic sulphur compounds.

Oberbaudirektor Ludwig, General Manager of the Berlin Municipal Gas Undertaking, supplied the very interesting information that he had learned from the Linde Company that plant for the treatment of not less than 150 million c.ft. of coke oven gas daily by the liquefaction process was already working or on order, in connection with the production of synthetic ammonia. The liquefaction itself presented no great difficulty; it was only a question of finding out to what extent it could be fitted into the gas-works process. It was the intention of the Berlin Undertaking shortly to carry out tests on these lines on a fairly large scale. In his opinion it was an obligation upon the larger concerns to study such problems as this in the common interest.

On the question of costs, Dr. Bertelsmann expressed himself as being more optimistic than Dr. Kemmer. It was his idea that, when the time came to supply a non-poisonous gas, more use would have to be made of water gas than is done at present, in order to arrive at a final gas which would satisfy the requirements of modern apparatus. With this optimism the author could not agree, in the absence of any reliable data upon which to base estimates of cost. In his opinion, there were fallacies in the idea of using greater quantities of water gas, in that it would mean a higher percentage of carbon monoxide to be removed, and secondly, that the heat unit in water gas in most cases costs more than the heat unit from carbonization.

In reply to a question as to when and where further information on the research work on the subject would be available, Dr. Kemmer was non-committal. There was still a very great deal of work to be done before any really useful data could be published, and, till then, nothing must be expected.

THE PURSUIT OF ACCURACY IN COAL SAMPLING.

By CHARLES F. KINGDON

From the July Issue of the Journal of the Institute of Fuel.

It is generally recognized that the principal errors made in sampling are due to the uneven distribution of shale and other impurities among the coal, and the consequent difficulties that are met with in endeavouring to include the proper proportions of them in the sample.

From theoretical consideration, it would appear that the surest way of obtaining an accurate sample of a heterogeneous mixture would be to take a certain proportion of every small measureful of the whole bulk; the smaller the measure (within certain limits) the better the result. The limiting size of the measure will be determined by the size of the largest particles, of which there must not be too few in each small portion taken; the question as to how many may be considered sufficient being settled by experiment.

In the collection of the gross sample, more accurate results would be expected from a large proportion (say 10 p.ct.) taken in this manner and reduced by re-sampling in the same manner to 1 p.ct., than by taking only 1 p.ct. in the first instance; but the practical application of this principle to large quantities of coal may be difficult of attainment on account of the cost of the necessary machinery and the possible delay occasioned by using it. It can, however, be applied easily to the work of reducing the gross sample, by means of simple mechanical apparatus similar to that hereinafter described, which has been proved in practical operation to give more consistently accurate results than the usual hand methods, as judged most conveniently by the ash content of the small samples obtained by repeated reductions of the same gross sample.

If the percentage of ash is to be accurately determined, it is necessary to go very carefully through a process of crushing, mixing, and dividing, never reducing the quantity of coal below the minimum allowable for the size of the largest particles in accordance with the theory of "size-weight ratio." This minimum is ascertained by experiment, and may be varied with different coals, but if fixed to suit the worst coal generally dealt with, it will be quite safe for all cleaner coal, so long as the same process is followed.

It has been recommended that the whole gross sample should first be crushed till its largest particles do not exceed about $\frac{1}{8}$ in. diameter, and then be reduced in quantity to 5 or 6 lbs. by "quartering" or "riffling." Grinding to a finer grade is then advised before reducing to the 8 oz. or so required for the various laboratory tests. But when the gross sample amounts to several hundredweight of coal, this method requires heavy and costly machinery, which may not be available for many workers. It then becomes necessary to minimize the crushing and grinding by doing the work in several more stages, taking particular care to mix the sample thoroughly at each stage.

If we could be sure that the mixing was perfect, we could take any small part of the sample and know that it truly represented the heap from which it was taken, but this condition can only be approached when we reach the smaller quantities and finer grades. Even then it is not too easy to arrive at, as can be very usefully demonstrated by each analyst taking two powders of different colours (say black and white) and mixing them by hand in several ways until no streaks of either colour can be seen. The mixing process, which gives the desired result in the shortest time, can then be applied with some confidence to the mixing of his final coal sample before weighing-off the small portions for analysis.

The difficulties of mixing, however, are much greater when the particles vary greatly in size (say) from $\frac{1}{4}$ in. down to fine powder, as they do during the stage-to-stage method of reduction; consequently, there are many chances of introducing errors in the usual hand method of repeated "quartering."

Some idea of these errors may be gained by mixing a known weight of crushed white marble or red tile, about $\frac{1}{4}$ in. in size,

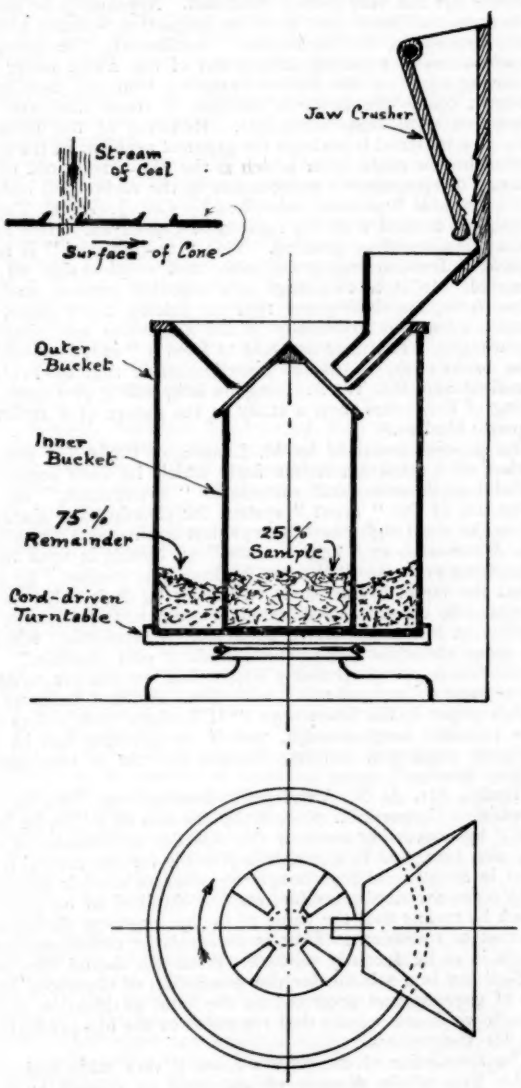
with a quantity of coal of all grades, from ¼ in. downwards, "coning and quartering" as usual, and then picking out and weighing the coloured material from each quarter. This can easily be done after sifting out the finer coal. Great inequalities will probably be found among the four quarters, which may, or may not, be equalized by adding two opposite quarters together. A further quartering of either of these halves has been found sometimes to reduce the error, but sometimes to increase it.

Example.—Mixture, 300 grammes contained 56 grammes tile, quarters were equalized in weight, and each test was repeated.

Number of Times Quartered.	Weight of Tile in Quarters.				Tile in Halves.		Error. P.Ct.
	A	B	C	D	A + C	B + D	
Once	14·6	11·7	12·9	16·8	27·5	28·5	± 0·33
,, ...	11·4	15·2	16·2	13·2	27·6	28·4	± 0·27
Twice	7·3	5·7	6·7	6·1	14·0	11·8	*nil* or − 2·9
,, ...	6·6	10·6	7·2	6·0	13·8	16·6	− 0·3 or + 3·5

A	B
D	C

As the amount of ash contained in the larger grades of coal may differ greatly from that in the coal-dust, and as it is difficult to preserve the correct proportions of coarse and fine when quartering, it is recommended that the fine coal (say through ⅛ in. mesh) should be sifted out of the sample and quartered separately, to be afterwards mixed with the correspondingly

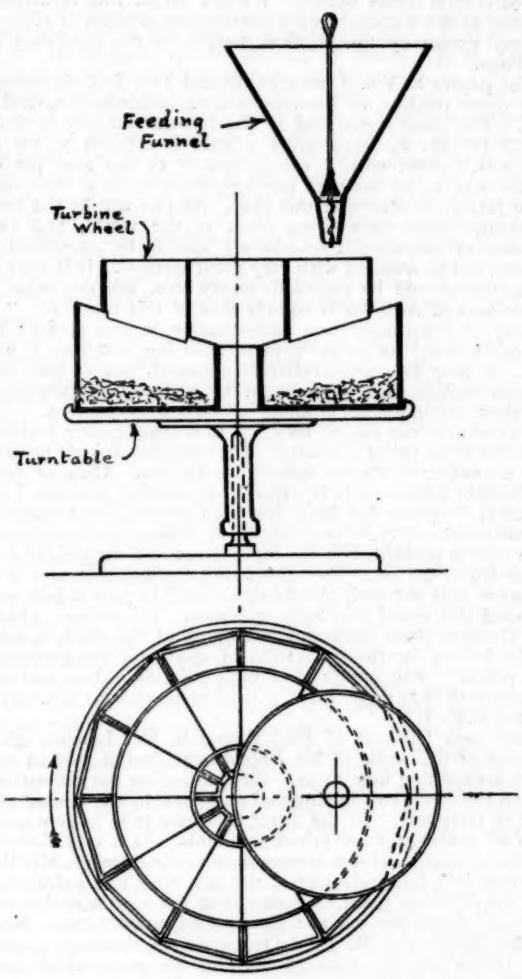


Sketch 1.

reduced portion of coarser coal when the latter has been crushed to the same grade.

Much time may be saved, and greater accuracy be ensured, by the use of some form of mechanical divider or "riffle." Such an apparatus ought, however, to be proportioned to the size and quantity of material which is to pass through it; two or more sizes will therefore be needed to obtain the best results. The divider should give the same result in repeated trials with the same sample and should show no tendency to select any particular grade or quality of material. These conditions have been proved to be satisfied by the two types of revolving riffle shown in the accompanying sketches. They were designed by the writer, and have been used successfully for some years.

Sketch 1 shows the larger machine, which samples the coal as it flows from the jaw crusher, where it has been reduced to about ¼ in. in size. A specially shaped hopper receives and



Sketch 2.

directs the coal in a narrow parallel stream on to the conical cover of the revolving inner bucket, where a chosen proportion of it (about 25 p.ct.) passes through the slots to form the reduced sample, while the remainder slides down the face of the cone into the outer bucket. This outer bucket also revolves, but only as a convenient means of imparting motion to the slotted cone. The edges of the slots in the metal surface of the cone are turned up at an angle sloping in the direction of motion, so as to cut cleanly into the stream of coal, and to prevent particles from passing through the slots which should slide into the outer bucket.

Sketch 2 shows the smaller riffle, which divides the reduced sample after it has been ground to pass 1/20 in. sieve. It consists of 12 wedge-shaped receptacles, which fit closely together on a turntable, and are revolved rapidly by the fingers of one hand, while the other hand operates the stirring rod in the feeding funnel, and so ensures a steady stream of coal. A small turbine wheel fits concentrically over these receptacles and has twelve blades whose upper edges are inclined in the direction of rotation to avoid scattering the coal, and whose lower edges are divided in thickness so as to cover the joints between the receptacles and ensure that no particles of coal go astray. The sample is thus divided into twelve parts, of which either 3, 4, or 6 are taken (from equi-distant points around the circle) to form the reduced sample which is to be ground finer, and then again riffled until about 4 oz. is obtained, which is ground till it all passes through a 60-mesh sieve.

The accuracy of these revolving riffles has been recently tested, with highly satisfactory results—see p. 349.

PROCEEDINGS OF THE SECOND INTERNATIONAL CONFERENCE ON BITUMINOUS COAL; PITTSBURGH, NOVEMBER, 1928.—VOL. 1.

By "TAMBT."

The Second International Conference on Bituminous Coal held at Pittsburgh in November, 1928, resulted in Proceedings which have just been published in two volumes of nearly a thousand pages each. These pages, comprising some 110 papers and the resulting dimensions, contain matter of very unequal merit. Much of it is repetition of what has been published several times before. We are afraid this is inevitable as long as the success of such conferences as these is measured to any extent by the physical weight of the published Proceedings.

The papers in Vol. I. may be divided as a first classification into those relating to low-temperature carbonization, and the rest. The most interesting in the former category is that in which Dr. R. P. Soule gives a brief description of the new "K.S.G." plant with a rated capacity of 650 tons per day, which was to be brought into operation at New Brunswick, New Jersey, in March of this year. As this will be the largest low-temperature carbonizing plant in the world, and as its chances of commercial success are said to be unexcelled, the results will be awaited with very great interest. It is time that a success should be recorded somewhere, because what Dr. Soule says of America is equally true of this country. "The history of low-temperature carbonization in this country (that is, the U.S.A.) up to the present time has not been a happy one. It may be conservatively estimated that at least thirty million dollars have been spent by various organizations in fruitless attempts to promote a successful process." And the reason is not far to seek. "Low-temperature carbonization, far from being a solution of present-day coking problems, has a number of clearly defined limitations. Only in certain favourable situations is it superior to existing practice." The "K.S.G." system has been described several times before. It consists essentially of two concentric drums externally heated. The coal is preheated in the inner drum and carbonized in the outer drum, the latter operation being conducted at such a temperature that the coal, previously crushed to pass a ¼-in. mesh, is fused and rolled into balls or lumps. The breeze, which in the German plant amounted to 20 p.ct. of the yield, is burned under boilers for the generation of steam for the process and for power. The gas is of a high calorific value, and when mixed with water gas gives a total yield of 8000 c.ft. per ton of 535 B.Th.U.

Our own Director of Fuel Research, Dr. Lander, gives a résumé of the work of his Department during 1927-28 which contains nothing new to us. He emphasizes the difference between the conditions in England and those in the United States and in Germany. In the latter countries it is largely a question of grading-up low-priced materials. In a very fine paper on the economics of low-temperature coal treatment, Mr. W. A. Darrah, in a full statement of the case from this point of view for the Thyssen plant, assumes that the raw material would cost one dollar per ton and the finished product five. Messrs. James Balph and M. J. McQuade, in an economic paper on the Hayes process, take 75 cents as the price which can be obtained for their raw material, a soft slack, amounting to about 40 p.ct. of the output of their mine near Pittsburgh. No such proportion exists in England between the prices of the raw and the finished materials. "Our major problem in Great Britain," says Dr. Lander, "is to take a high priced raw material and convert it in enormous quantities into a smokeless fuel which, ton for ton, will not command a price much, if anything, above that of the raw coal." Frankly we do not see that either Dr. Lander or anyone else produces the slightest evidence that such a feat can be performed with economic success.

Prof. Parr describes a process in which, apparently, coal is first heated to 300° or 400° C. in a rotary kiln, and then carbonized in an oven with expanding sides. The plant described by Dr. Lander was the E type cast-iron semi-intermittent vertical retort which has been installed by the Gas Light and Coke Company with capital guaranteed under the Trades' Facilities Act. Dr. F. P. Kerschbaum contributed a most interesting and informative paper on the treatment of lignite (braunkohle) in Germany, describing an old-established system, the Rolle carbonizer, in which the material is heated in an annular space between a "lattice of conical cast-iron rings and a fireclay wall," and the recently developed Lurgi system in which the material is first dried and then carbonized in an internally heated system through which it travels continuously by gravity. Mr. Yoshisada Ban describes a continuously operating cast-iron vertical retort externally heated for low-temperature carbonization which he is at some pains to differentiate from the E type retort of the Fuel Research Board. In the "C.T.G." circular cell oven described by Mr. Josef Plassman, a coke of extraordinarily close texture is produced from dust coal. M. Paul Weiss describes a system in which fine coal, briquetted with a pitch or asphalt binder, is treated with superheated steam. The mass of briquettes is supported in the retorts by rings of special form, to prevent deterioration under pressure. It will be remembered that in the Sutcliffe-Speakman plant at Leigh the briquettes are formed under pressure and without binder, rendering this precaution unnecessary.

Mr. Charles Turner, with many unnecessary platitudes, describes another system in which steam is the internal heating medium. The "Carbocite" process, described by Mr. W. H. Allen, of the American Gas and Electrical Company, New York, resembles the "K.S.G." process in that the small coal is treated in two stages, in two rotary kilns, though in this plant separate from one another, and that in the second stage the fused coal is rolled over and over to make lumps or balls. These range up to 4 in. in diameter, and the unsaleable fines under ½ in. constitute about 20 p.ct. of the yield. Mr. Harald Nielsen, in a long paper on the "L & N" process, devotes most of his space to the consideration of the properties of the oils produced. Mr. Crozier, whose process has been reported upon by the Fuel Research Board, is also mainly concerned with the production of oil. Prof. Seidenschnur, of Freiberg, gives an account of researches and experiments made at the State Institute of Brown Coal Research in Saxony, but his processes are not very clearly described. Apparently he makes the brown coal itself into balls or briquettes without binders before proceeding to distillation. Incidentally, he mentions two questions of nuisance arising out of the waste water and the strong smell of the liquors resulting from the distillation of brown coals—the latter is familiar to those who have experimented with these materials. Removal of the moisture in the raw material is perhaps the greatest problem in the treatment of brown coals, after which is the risk arising out of the tendency to spontaneous combustion in the carbonized residue. The "Trumble" process, described by Col. J. W. E. Taylor, is designed to deal with the lignites of California. Here again it is a question of up-grading. This "useless coal" is made to yield a free-burning grate coke, and considerable oil and ammonia. It is a two-stage steam-heated process, and we gather from the description that no coking takes place, the pieces coming out practically of the same size and shape as they went in. The fines are said to form a "mat" which has to be broken up. A useful contribution is that of Prof. E. Stansfield and Mr. W. A. Lang on briquetting processes, the testing of briquettes, and a study in the nature of a review of briquette binders.

The process described by M. Léauté, of Paris, for the production of a hard smokeless fuel, which he calls sometimes artificial anthracite, and sometimes "Trenthacite," because of the use of the "Trent" system for cleaning the slacks, is not unlike the Leigh plant, except that again—and we think it is a drawback—an "agglomerate" or binder is used in the briquetting process. "We are beginning to realize," he says, "that the liquid bye-products, whatever be their value (which is, after all, often over-estimated), cannot suffice to make distillation at low temperature profitable, if semi-coke, which is the most abundant bye-product, finds a poor market." The translation is not particularly happy, but we can see what the writer means; and we agree with him. Another point we like in this paper is the following: "If bunkers and boilers have been provided large enough, and if the draught can be conveniently regulated, nothing hinders the use of combustibles of low density."

Finally, Mr. J. N. Vandegrift describes the International Bituminoil Corporation process, by the use of which he hopes that "by converting most of the volatiles of bituminous coals into oils, tars, and rich gas, it is possible for the central power plant in many localities cheaply to generate electric power derived from the smokeless fuel residue obtained at no cost," by which he means that the value of the bye-products should cover the cost of treatment. That is an ideal the consummation of which is to be devoutly wished. What we should like to see worked out is a scheme for the generation of electricity by the use of gaseous fuel produced by the total gasification of coal, though we do not expect that the value of the bye-products will pay for the process.

The remainder of the papers cover a very wide and varied field. The whole domain of catalysis as related to hydrocarbons is traversed by Dr. Carl Krauch in an intriguing essay from which we are not able to disentangle anything very definite as to the details of the process used, but in which we read of many interesting things. In the main we miss any reference to the attempts which we assume are being made to influence in this way a direct formation of methane in the reactions between steam and heated carbon, though possibly a hydrogenation of CO and CO_2 is really working in this direction. Anyhow, the definite statement is made that at Leuna

there is already an annual production of 70,000 tons of gasoline (petrol), of which 40,000 tons is obtained from coal, and that this will be easily raised to 250,000 tons—(say) 50 to 60 million galls. A short contribution by the famous Dr. Bergius deals with his interesting researches on the artificial production of "End Coal" from cellulose, and the conspicuous similarity of the Berginization products from this and from natural coal. Dr. A. E. Dunstan's paper on the cracking of low-temperature coal tars, and incidentally of tars of low commercial value, and on the Berginization of such tars in the presence of catalysts, is perhaps one of the most lucid and definite of the papers in the whole of the Proceedings, though much of the result is negative.

We revert again to this subject and to relevant problems in a series of nine papers in Vol. II. introduced by an excellent survey of "Some Aspects of the Hydrogenation of Coal," by Mr. J. Ivon Graham. There is very little in this section in the way of startling new discoveries, but one obtains the impression that an exhaustive exploration is taking place of the whole field of the hydrogenation of coal, coal tars, and pitches, the influence of varying temperatures, pressures, and catalysts, and particularly attempts to obtain valuable products from, or to improve the quality of, low-temperature and other inferior tars. More and more is the fact being stressed, expressed somewhat quaintly during the discussion, that, "if low temperature is going to come into its own, it is going to come only as we solve the low-temperature tars."

Prof. H. S. Taylor and Messrs. Gauger and Salley are interested in the effect of inorganic materials on the carbonization of coals and lignites—a field which has been well explored by Prof. Cobb and his students under the Research Committee of the Institution of Gas Engineers in this country. "The lignites of the great plains present an interesting example of a coal that does not coke when carbonized under existing methods." And as there are many deposits of this and similar material both in the U.S.A. and in Canada, the importance of discovering some means of overcoming the difficulty is obvious. The results so far achieved, and the suggestions put forward, are not impressive.

Messrs. Goodwin and White, of London, describe an interesting process for using recently and artificially rotted vegetable pulp as binding material for the production of briquettes from fine coals, which may be leading to something profitable. The composition of the "dry chemical preparations which consist, incidentally, of well-known heavy chemicals obtainable at stable prices in all parts of the world" is indicated in the written reply of the authors to the discussion, in which they say "these are substantially of the nature of a mixed fertilizer, containing nitrogen, phosphate, &c., in suitable proportions." It is stated that the process should be seriously considered in cases where a total cost of briquetting of 2 dollars per ton is commercially permissible.

Dr. Sinnatt, Assistant Director of Fuel Research, gave an account of his work on the formation of cenospheres, preceded by some wise observations on the heterogeneity of coal seams. This work was begun while he was in Manchester, and is well known to English experts.

Dr. Stadnikoff, of Moscow, contributes two reports, mainly on Siberian boghead coals, containing much data which may prove useful. Mr. A. C. Fieldner submitted a brief review of the first year's work of certain committees that were set up as a result of the First International Conference to study the question of the classification of the North American coals. The work is well on the way; and if the final result is the production of "a simple system of classification, both scientific and useful," it will be well repaid. "Coals are like man," said one of the speakers, "no two are exactly alike, yet it is possible to divide them into classes." It is evident, however, that the classification will have to be made along more than one line if it is to be capable of universal application. It is probable that each user or group of users will have to re-classify according to their requirements. Dr. Thiessen, of the U.S. Bureau of Mines, in an account of recent developments on the constitution of coal, gives many beautiful photographs of microscopic sections and other views of coal specimens, and covers the ground very comprehensively. His paper was an exceptionally good one.

A little paper called "Carbon, Hydrogen, and Capital," by F. Zur Nedden, of Berlin, seems to us to contain some original ideas—or, at least, ideas in an original form. The author shows that the trend of developments is everywhere in the direction of "the improvement of coal" by transforming this "rather cumbersome compound of hydrocarbons fraught with heavy weight and a ballast of ash and humidity," into gas, oil, and electricity. This applies even in the United States "where manufactured gas is sold in larger quantities than in any other country of the world, both in total production and in production per inhabitant; and where approximately two-thirds of the electrical energy generated is generated from coal, in spite of the fact that the country is richer in water power than almost any other country of the world." Coal improvement enlarges the limits of industrial productive capacity. As the supply of energy is the basis of modern civilization, the investment of capital in it "acts as a stabilizer, evening-out the fluctuations in the occupation of industry and labour." Dr. E. W. Smith and Mr. Campbell Finlayson, in discussing the World Fuel Conference and the gas industry, are fain to put up a defence of the Conference itself, with its enormous mass of still undigested papers. With all they say about the interest for nationalization, for amalgamation, and co-ordination in the gas industry, we are in complete agreement. Dr. Little and his collaborator dilate on the fact that in the United States, as in other countries in the world, the vast increases in the consumption of heat and power are being met mainly by increases in efficiency. Their tone is a curiously apologetic one; but surely it is ultimately all to the good if we are getting more out of this irreplaceable supply of coal.

We venture to think that one of the most important papers in these Proceedings is an analysis of the consumption of bituminous coal in the United States by Messrs. F. G. Tryon and H. O. Rogers, of the Bureau of Mines. It is packed full of data showing the distribution and growth of coal consumption throughout the industrial world. Truly interesting is a table giving this distribution for a typical year of industrial activity by combining and selecting the figures for several years from 1923 to 1927. Here again keen attention is called to the astonishing increase in efficiency in nearly all industrial applications of fuel, at present so rapid as to check the increase in the gross consumption of coal. But these authorities have the wisdom to see that this is merely a passing phase, that the limit of efficiency will shortly be reached, and that the still more rapid increase in the gross consumption of power and heat will very soon overwhelm the temporary effect of high efficiency.

A touch of romance is also applied in the address given by the famous Frenchman, M. Georges Claude, who, at the end of a racy account of his adventures in the field of research and invention, refers to his proposals, already in the first stages of realization, for the generation of power by utilizing in steam turbines the temperature gradient between the waters at the surface and at the bottom of the ocean in tropical regions.

Lord Melchett, in a powerful review of "Coal Problems in Perspective," shows a none too despondent attitude towards the future of the mining industry, and the "tremendous economies which could be effected by the internal reorganization on the technological side of individual pits and groups of pits." He visualizes the boon to all productive industries of the establishment, particularly in Britain, of coal areas with central power stations from which electrical power, gas, the multitudinous coke-oven products, smokeless fuel, and oil will be distributed throughout the industrial areas of the country.

The paper on "Fuel Problems in the Iron and Steel Industry," by Mr. Edgar C. Evans, is a statistical masterpiece showing mainly how the accumulation of carefully collected data is helpful in correlating the results of fundamental research with those of practical operation; and Dr. Ernest Terres' paper on "Heat Expenditure in the Coking Process" is welcomed as indisputable evidence of this thesis, and as a valuable contribution to the fundamentals of the science of coal carbonization.

In "New Aspects of Coal Economy," Dr. Jacobus G. Aarts refers to what would appear to be a revolutionary process evolved at the Technological Institute at Dorgen, in Holland, for the production of a new class of fuels, "Carbonalpha" (molecular carbon) and "Carbonalphine" from coal and other carbonaceous materials. It is claimed that these fuels, said to be produced auto-catalytically by the decomposition of the gases produced by complete gasification of solid fuels, have extraordinary combustion and other valuable properties. It is a pity that this paper is so sketchy and gives so little detail. If the economic and other claims of this invention can be substantiated, there is certain to be a complete and rapid revolution of many modern fuel utilization processes.

Two papers by Prof. Ramzin, Director of the State Thermo-Technical Research Institution of Moscow, show that Russia is getting very effectively down to the problem of estimating and evaluating her fuel resources. His data with regard to the use of chipped firewood and pulverization of brown coals are likely to be of use to those who may shortly enter the Russian markets.

In the first volume alone there are at least eight papers on pulverized fuel, which fact testifies to the keen interest felt in this subject. Dr. R. Pawlikowski describes the "Rupamotor"—an internal combustion engine using brown coal pulverized to pass a 300 mesh, a development of the Diesel engine from which great things may result.

Mr. Walter Kleinow, of Berlin, describes a locomotive giving excellent results with pulverized coal, though it is difficult to get any quantitative idea of them because of the mixture of units used in the paper. The general advantages are obvious if the capital cost does not outweigh the savings in fuel and labour. Dr. Blythe described several other applications of powdered fuel; but here again we miss any possible data upon which an estimate of the over-all economies effected could be based. Two other general articles on the same subject are contributed by Dr. Rosin, of Germany, and Mr. Kreisinger, of New York; the former being a scientific treatment and the latter a practical treatment chiefly describing large modern steam-raising plants. Mr. J. W. Armour compares the modern

mechanical stoker with its advancing rival pulverized fuel, and finds "that the art of burning bituminous coals has reached that point where it is difficult to choose between pulverizers and stokers." The results achieved by the designers of powdered coal installations have spurred the mechanical stoker to greater efforts; and we have a story which could be paralleled in many branches of industries where the older method has been developed to the point where it can again hold its own in the competitive field.

We have all at one time or another been surprised, and perhaps disappointed, that no advance has been made in the application of mechanical methods of feeding solid fuel to marine boilers. The mechanical stoker seems to have failed to solve this problem, and it remains to be seen whether the victory is to be with the pulverizers. Mr. Jefferson and Commander Broshek, of the U.S. Navy, claim that success is already achieved. The problem seems to be largely one of getting the combustion rate per cubic foot of furnace volume up from the theoretically desirable 1 or 2 lbs. of coal per hour to something in the region of 4 to 6 lbs. without serious loss of boiler efficiency; and the solution of this problem is likely to have important repercussions in the application of powdered fuel to the smaller land boilers. We gather that pulverization is carried to the extent of 70 p.ct. passing a 300 mesh, and combustion is so far perfect that the waste gases contain 17 p.ct. of CO_2, and an equivalent evaporation of over 11 lbs. of water per lb. of coal is obtained.

An interesting phase in connection with this subject of pulverized fuel is the question of transport in bulk of this material. This is dealt with in considerable detail in the last paper of the series, by Dr. Goossens, of Germany, in which is contrasted the cost of pulverizing plant *in situ* with the cost of conveyance of the powder through pipelines or by means of special tank cars from a central pulverizing station.

NEW BRASS MELTING GAS FURNACE.

By ALEXANDER FORWARD.

From the "A.G.A." Monthly.

Through co-operative research, sponsored by the American Gas Association, there has recently been developed a radically new type of brass furnace, which, through its greatly improved efficiencies, including decreased fuel, maintenance, and labour costs, reduced metal loss, increased output, and improved castings, bids fair to revolutionize the brass foundry industry. For the first time in the history of the brass industry, the short-lived crucible and refractory-lined furnaces have been supplanted with a retort of special alloy metal apparently of indefinite life.

Furthermore, foundrymen have never before known how to avoid the great loss of metal in brass melting, or the heavy cost of crucible maintenance, and have been at a loss as to the most economical fuel to use. In many types of furnace, metal losses during operation equal or exceed the cost of fuel, whether gas, oil, or coke.

The development of a metal alloy that would withstand working temperatures in excess of 2000° Fahr. repeatedly, in contact with molten metal, was a part of the research programme; and while crucibles have a life of only about 15 or 20 heats, a single retort made from the alloy finally produced has already served for more than 250 heats and is none the worse for wear. The research in connection with the development of this equipment was done under contract between the American Gas Association and the American Gas Furnace Company, of Elizabeth, N.J.

This new brass melter consists of a revolving metallic retort, externally fired and enclosed in a shell heavily insulated and refractory lined for heat concentration, atmospheric control, and fuel conservation. The insulated sheet steel drum or shell is mounted on two bearings held by a steel frame so that it can be tilted at any desired angle. Ten gas burners, five on each side, are mounted on this drum in such a manner that they fire into its interior. Within the drum is the special alloy metal retort so mounted that it revolves with a motor and variable chain and gear drive.

Air under pressure for combustion is supplied to the gas lines serving the burners, and the gas-air mixture can be so regulated as to provide any desired atmosphere—oxidizing, reducing, or neutral—within the combustion chamber, which is the space between the shell and the retort. In this case a slightly reducing atmosphere is maintained so as to prevent oxidation of the retort.

A thermocouple projects into the combustion chamber and is connected with a temperature control and recording pyrometer, and in this manner the temperature of the furnace is maintained automatically and regardless of the operations of pouring and recharging. The frame containing the furnace is fabricated from structural steel members, and a chain hoist is used for tilting, but in the later designs this is obsolete, and a much neater set-up is provided.

The first of these to be used in commercial practice was installed at the plant of the Trenton Brass and Machine Company, Trenton, N.J., a firm manufacturing plumbers' supplies, and selling direct to jobbing plumbers and makers of sanitary ware. The various articles here are cast from commercial bronze and yellow brass compounded in the melting furnaces and poured direct.

It was indeed fortunate that this particular foundry was the first to try out the new gas furnace, for besides being one of the oldest, most progressive, and best managed foundries, it had used every kind of fuel and energy and every type of brass melting furnace in an effort, prolonged over many years, to reduce melting costs to a minimum and obtain the best possible control over its foundry practice and the final quality of its castings.

The plant and equipment of this Company are housed in a three-storey building, 40 ft. by 275 ft., with the foundry on the top floor. Prior to the innovation of the new gas melter, coke-fired pit furnaces, gas-fired furnaces, and electric furnaces had been rigidly tried and discarded, and the oil-fired crucible furnace had been standardized upon.

There are twelve of these crucible furnaces located at one end of the foundry in three rows; and inasmuch as they represent the best foundry practice which the management of this concern have been able to effect over a period of several years, they afford a most valuable yardstick with which to measure the economies of the new gas melter. Furthermore, the same foundry practice is used with both, so there is no chance for variables to enter.

The practice is as follows: The flasks are made up on air moulding machines, sixteen in number, arranged along one side wall, and the pouring floor occupies that part of the room immediately adjacent. At the other end of this pouring floor and line of moulding machines is a circular pouring unit consisting of two small and parallel steel rails, about 6 in. apart and a foot above the floor, forming a circular enclosed track approximately 32 ft. in diameter. Within the circle are four mechanical moulding machines; and after the flasks are made up on these they are transferred to the tracks, where they remain stationary during the pouring and cooling.

The principal feature of this pouring unit is an exhauster for the zinc oxide fumes, consisting of a post in the centre which carries an overhead pipe to a point directly over the track, and to which is fitted a hood. In addition there is a chain hoist with a pouring shank which holds the crucible at any desired height or position above the flasks; and while pouring, the injurious fumes are kept within the hood and exhausted through an extension of the pipe through the roof.

This exhauster rotates with the centre post so as to cover the entire circumference of the circular track. From 500 to 600 flasks can be made up and poured on this unit daily. Both this unit and the conventional pouring section are served with an overhead monorail system direct from the melting furnaces. With this system of handling, a pouring schedule very closely synchronizing with the heats is possible. The core room is at the further end of the main room and is equipped with gas-fired ovens in which the cores are baked.

Probably the greatest service rendered by this new gas furnace, apart from the elimination of crucible and refractory maintenance and remarkably low fuel consumption, is the exclusion of metal losses through volatilization and oxidation while the charge is being melted. With the best practice that can be obtained with the crucible, the volatilization losses run between 5 and 6 p.ct., and each crucible, as it is pulled from the furnace, has to go on the skimming table and be skimmed of the oxidized metal before it can be taken to the pouring floor.

Almost all the composition used in the castings here is a yellow brass containing 72 p.ct. copper, 1½ p.ct. tin, 1½ p.ct. lead, and the remainder, approximately 25 p.ct., is zinc. The zinc has a very much lower melting-point than the copper, and, when melted in the presence of air, volatilizes readily; and this action causes a very material loss of zinc metal from the original charge. Consequently, the resulting castings vary in chemical analysis from heat to heat, day to day, and month to month. To eliminate this and the oxidation loss, the retort of the gas melter is fitted with an air-tight cover which is bolted on securely.

Of course, when a new charge is put in, certain gases are given off, of which the retort must be relieved, and this is accomplished through a short pipe which is part of the cover. As soon as these gases start to form, they are lighted and allowed to burn at the end of this pipe. In a few minutes they are exhausted, the flame extinguished, and the operator thereby

knows that it is time to screw the air-tight cap on to the end of the pipe, thus sealing the entire retort charge from the outside atmosphere.

With this method of melting, the only losses are during the pouring operation, and are so minimized that there is hardly any variation in the chemical analysis of the resulting castings. Furthermore, a more homogeneous casting is produced and one that is more easily machined than those made from crucible metal, and at the same time the physical characteristics remain unchanged.

The astoundingly low fuel consumption of 2½ c.ft. of gas per pound of brass melted is one of the principal achievements of this furnace. Other economies effected include a considerable labour saving and faster heat transfer, which reduces the melting time and assists in lowering the fuel requirements. There is still another appreciable fuel saving from the fact that 800° of heat remain in the retort in the morning (except Monday). Inasmuch as this gas furnace is smokeless, fumeless, noiseless, and gives off only a small amount of heat, the working conditions of the foundry are much improved, which adds materially to the efficiency and industry of the operators.

The volume and diversity of castings turned out at this plant can be partially gauged from the fact that there are between 2000 and 3000 patterns in active use.

ROCHDALE GAS-WORKS.

On July 29 a new high-level road and a coal store were inaugurated at the Rochdale Gas-Works; and the occasion served as an opportunity for the Council to inspect the works generally. The following description is extracted from a booklet, profusely illustrated, which was prepared to mark the event.

The Rochdale Gas-Works occupy a site on the westerly side of the town, and are admirably situated from the point of view of pressure, being in the lowest part of the town. The coal sidings are approximately 1¼ miles away, and coal has to be brought to the works in the Department's motor vehicles.

The coal storage capacity has recently been augmented by the erection of a new store, approached by an overhead roadway. It has been erected in place of, and on the same site as, a previous store. The contractors for the whole of this work were Messrs. R. & T. Howarth. Its principal dimensions are 117 ft. long by 50 ft. wide by 33 ft. 6 in. high, and its capacity is approximately 4000 tons, bringing the total storage capacity at the works up to 9000 tons.

Designed by Mr. S. H. Morgan, M.Inst.C.E., the Borough Surveyor, the store consists of a reinforced concrete floor and roof, the latter being supported by a reinforced concrete framework with brick panels forming the side walls. The floor rests on beams connecting the heads of reinforced concrete piles, some of which have been driven into the ground to a depth of 34 ft. The arrangement of the steelwork for the reinforced concrete work has been designed by Messrs. L. G. Mouchel & Partners.

The overhead roadway to the store, also designed by Mr. Morgan, is carried for a portion of its length on five brick arches, each having a radius of 12 ft. 6 in., and supported by brick piers, each designed to carry a load of 590 tons. It then joins up with the roof of the store, which is provided with openings along each side through which the motor lorries discharge their loads after having been weighed at the entrance.

The chief class of coal carbonized is washed nuts from the Lancashire and Yorkshire coalfields. From the stores the coal is fed to the breakers by elevator or conveyor, and thence to overhead storage bunkers in the retort houses.

CARBONIZING PLANT.

The carbonizing plant comprises two vertical retort installations:

(*a*) Glover-West (reconstructed 1927). Consists of three settings of eight retorts (units of twos), 33 in. by 10 in. by 25 ft. long, carbonizing nominally 3½ tons per retort per day. Coal is fed to a double-claw breaker, which is outside the house, by means of a bucket elevator, and thence by a lip-bucket conveyor to the overhead coal bunkers.

The conveyor completely encircles the settings, and is also used for conveying coke from the bottom mouthpieces to a transverse rubber belt conveyor, which in turn carries it to the rotary screen, through which it passes and is afterwards discharged into reinforced concrete bunkers having a capacity of 135 tons.

(*b*) Woodall-Duckham (erected 1925). Consists of four settings of four retorts each, 25 ft. long, carbonizing nominally 7 tons per retort per day. An inclined tray conveyor feeds the breaker inside the house, the coal then passing to a lip-bucket conveyor encircling the settings and also extending outside the house to the coke screen, since it is arranged to handle both coal and coke.

A waste-heat boiler is incorporated in this plant, and is capable of raising 2800 lbs. of steam per hour at 120 lbs. pressure from feed water at 60° Fahr. when all the settings are at work.

A mess room and bathroom are provided for the stokers on the charging stage, and the carbonizing foreman's cabin is on the ground floor.

Each retort house is capable of accommodating two additional settings.

GENERAL PLANT.

The condensers are of the water-tube type, and were supplied by Messrs. W. C. Holmes & Co.

The exhausters are of the four-blade type, by Messrs. Geo. Waller & Son, in two pairs, one pair acting as a stand-by.

The tar extractor is of the "P & A" type, supplied by Messrs. W. C. Holmes & Co.

One pair of Messrs. Holmes' standard 3 million c.ft. per day washers, arranged in series, deals with the gas after it leaves the tar extractor, and is fed with liquor; a third washer, by Messrs. Kirkham, Hulett, & Chandler, of a similar capacity, follows after and uses clean water.

The dry purification plant consists of:

(*a*) Six overhead boxes, 30 ft. square, downward flow, which were recently converted to the dry-lid type.

(*b*) Six overhead boxes, 30 ft. square, by Messrs. R. & J. Dempster, Ltd., dry-lid type with Weck valves. This unit is used alternatively for carburetted water gas purification.

Two station meters, by Messrs. J. & J. Braddock, are installed, and have capacities of 80,000 and 60,000 c.ft. per hour respectively.

The original water-sealed valves have recently been replaced by dry-faced valves for inlets, outlets, and by-passes.

A naphthalene washer was installed in 1927 on the outlet side of the station meters, and has proved very efficacious in eliminating naphthalene from the gas; no trace of it being found in the test samples at the washer outlet. It is by Messrs. W. C. Holmes, and has a capacity of 4 million c.ft. per day.

Four holders, of a total capacity of 3,750,000 c.ft., provide sufficient storage. In addition, there is a relief holder used in connection with the carburetted water gas plant.

Three governors, of Messrs. J. & J. Braddock's make, pass the gas to the three districts of Spotland, Castleton, and the Central Area; the diameter of the mains to these districts at the governor outlets being 20 in.

A calorimeter house, well equipped with the most up-to-date recording instruments, has been erected on the works, and the instruments are checked twice daily by the method prescribed by the Gas Referees.

WATER GAS PLANT.

This plant was installed in 1906. It is of the "Economic" type and consists of two machines, the total capacity of which is 1,600,000 c.ft. per day. Coke is elevated to the charging stage by a hydraulic lift.

A complete tar distillation plant has been in operation for nearly fifty years. It comprises three 12-ton externally fired pot stills for the primary distillation of the tar; three steam-heated naphtha stills, each having a capacity of approximately 1000 gallons; and two light oil stills similarly heated and of similar capacity.

The sulphate plant consists of a Wilton still, saturator, and rotary steam-heated dryer. The salt is ejected from the saturator by steam, and acid salt is neutralized on the drainer by spraying with weak ammonia. A heat interchanger warms up the liquor passing to the still by abstracting the heat from the waste gas leaving the saturator, which then travels through condensers and scrubber to a Claus kiln, where sulphur is formed and deposited; and any effluent gases are absorbed by a limestone scrubber and oxide heaps. The kiln may be by-passed and the gases passed direct to the oxide heaps. Storage is provided for 50,000 gallons of ammoniacal liquor.

The works are well equipped with up-to-date workshops, which include joiners' and fitting shops, installed with wood-working machinery and machine tools respectively, smithy, painting, plumbing, and gasfitting shops, meter and stove departments, mains and services department and stores.

The offices are situated at the main entrance in Dane Street, and comprise general offices, drawing office, and records and meter inspectors' offices.

The main laboratory is incorporated in the above block of buildings, and in addition there is a laboratory on the tar

plant, and a complete coal-testing plant, by British Furnaces, Ltd., housed on the ground floor of the water gas plant.

SHOWROOMS.

The main showrooms are in Drake Street, Rochdale, and in addition the Department possess a travelling showroom.

The Department's consumers now number 31,312, and the length of mains necessary to supply them is 135 miles. A scheme of free service is in operation, and this is effected by maintenance men who operate in the different districts allocated to them.

The coal carbonized during the year ending March 31, 1929, was 40,246 tons, and the gas sold 600,750,300 c.ft. (2,853,564 therms).

PEALE-DAVIS DRY CLEANING PROCESS.

Preparation of Coal for Carbonization.

Realizing the need for an efficient coal cleaning process, the Woodall-Duckham Company arranged in 1923 to investigate in Europe and America the various systems which were in operation. As the result of this investigation, which lasted three years, they came to the conclusion that the Peale-Davis system of dry cleaning was the most satisfactory process yet developed.

The Peale-Davis system was developed in America by one of the largest colliery concerns operating in that country, and was used for nearly five years in their own mines before the process was made available for general use. The Woodall-Duckham Company secured the rights of the process for the British Empire, excluding Canada, confident that this method of cleaning coal would prove to be a technical and economic success when applied in Great Britain—a fact which, they claim, has now been demonstrated by the operation of the first British plant at the Handsworth Colliery of the Nunnery Colliery Company, Ltd., Sheffield.

The Peale-Davis system makes it possible to handle on the table all sizes of coal from 3 in. (or even larger) down to dust. This eliminates the expensive preliminary screening plant and the trouble occasioned in screening the finer sizes. It is stated that the system is unique as regards the capacity of the tables. Up to 300 tons of coal per hour can be treated on one primary table and one re-treatment table. Another advantage is that, owing to the small amount of handling, the breakage of coal is reduced to a minimum. The dust collection is concentrated on two tables instead of many. This allows a simple dust collecting device to be used. The cleaning of the coal is carried out with a high degree of efficiency and with low power consumption and labour costs (one man and one oiler can attend to a 300-ton per hour plant). Both capital and maintenance costs are low. The adjustments are simple and flexible, and the performance of the plant at any moment is visible to the operator. In addition, it is possible to shut down or put into efficient operation the whole of the plant in two or three minutes. The dust is available for use.

The Peale-Davis cleaning plant consists of two tables: (1) A large primary table which takes the whole of the feed from a storage hopper and gives two products—(*a*) clean coal, and (*b*) a primary refuse. (2) A smaller re-treatment table which takes as its feed the primary refuse. This re-treatment table discharges (*a*) a clean coal product that is mixed with the clean coal from the primary table, and (*b*) refuse, which is sent to the tip. This arrangement ensures a minimum loss of coal in the refuse, and a maximum yield of clean coal.

The table consists of two decks separated by a series of air-tight compartments which in effect divide the table into a number of separately controlled units; and thus cleaning without pre-screening is secured. The top deck, which carries the bed of coal, is covered with perforated sheets. The area of opening of these perforations decreases towards the end of the table.

Running diagonally across the deck there are a number of separating partitions, formed by small angles. The table is mounted above a stationary air duct which, in turn, is connected with a fan. The table is supported by a number of rocking arms and it is given a reciprocating motion by means of an eccentric drive. This motion causes the bed of coal to travel along the upper deck towards the discharge end of the table.

Each table is adjustable for side inclination and end inclination, in order to get the best results with any class of coal. When operating, the current of air passes from the air duct through the decks and through the bed of coal. The quantity of air passing through each separate compartment can be individually regulated. The initial adjustments for table inclination and air distribution are only modified when changing to a coal of entirely different characteristics.

The bed of coal is agitated by the motion of the table and the current of air. A stratification of the bed takes place and the lower layer of the bed is trapped behind the angle separating partitions, which convey it to the high side of the table, while the upper layers pass over these partitions and have a tendency to travel to the low side of the table. Running along the high side of the table are a number of refuse boxes from which the refuse is discharged; the quality of the refuse being finally controlled by an air back-pressure device attached to each refuse box.

If a very large table were designed it would be possible definitely to reach a point where the coal and the refuse would separate completely, and it would thus be possible to make a clean cut between the two products. In practice this same result is achieved by having two tables. The first, or primary table, acts as a rough separator and delivers clean coal. This is done by allowing a considerable quantity of coal to pass away with the refuse. This primary refuse is treated on a second table known as the re-treatment table. In this instance three fractions are made: (1) A clean coal, (2) a coal-free refuse which is discharged to the tip, and (3) a middlings product which consists of the stream of material where separation is not complete. This middlings product is recirculated over the table, and thus eventually is discharged as clean coal or refuse. This re-treatment table is similar to the large primary table in construction, but is smaller.

The current of air leaving the bed of coal is naturally heavily laden with dust. The dust and air mixture is conducted into a large expansion chamber where it is subjected to a considerable decrease in velocity, with consequent precipitation of the dust. In this manner most of the dust in suspension settles out into pockets, from which it is conveyed and mixed either with the clean coal or the refuse, according to its quality. Alternatively, it may be used as pulverized fuel. As it is impossible to remove the finest dust particles in this manner, the air is recirculated through the fan and table by means of a return air duct; and thus any pollution of the outside atmosphere is prevented.

Tables can be constructed with capacities from 50 to 300 tons per hour, according to individual requirements.

SUSPENSION LIGHTING.

A Recent Installation at Romford.

One of the latest installations of the London Electric Firm's suspension system for gas lamps, which was described in the "JOURNAL" for July 11, 1928, is at Romford. It was erected by Messrs. William Sugg & Co., and is shown in the accompanying photograph. The London Electric Firm have been manufacturing their lowering gear for nearly twenty-five years, a classic instance being that in the City of London, which has been in use for many years now. It is employed for both electric and gas lamps, with the maximum of efficiency, the minimum of upkeep costs, and the maximum safety from obstruction, as there are no lamp posts whatever.

The lowering gear was expressly made to obviate the use of tower wagons and the like for suspension lamps. The arrangement provides for the lamp to traverse along the wire and be lowered to the side walk, so as to be entirely free from obstructing traffic, which in these days of increased speed and volume is an outstanding matter to be considered.

REGISTER OF PATENTS.

Gas Purification.—No. 288,977.

I. G. FARBENINDUSTRIE AKTIENGESELLSCHAFT, of Frankfort-on-Main.

No. 10,990; April 13, 1928. Convention date, April 16, 1927.

This invention is for a process for the purification of gases from hydrogen sulphide and/or ammonia, with the production of ammonium sulphate, by treating a metal sulphate in aqueous ammoniacal solution with the gas to be purified, working-up the filtrate to obtain ammonium sulphate, and reconverting a suspension of the residue of metal sulphide into sulphate by the action of oxygen at super-atmospheric pressure and at a temperature in excess of 120° C.

Inverted Burners.—No. 314,108.

SMITH, F., of Sunderland.

No. 8655; March 21, 1928.

This invention relates to incandescent lighting burners of the inverted type; and the patentee makes the following claims: For a single-mantle inverted incandescent gas burner for lighting purposes, a superheating chamber of the kind wherein the chamber is of flat cylindrical shape characterized in that it is fitted with a baffle disposed in close proximity to its base, so that the space between said baffle and the flat base of the chamber is of much less depth than the space above it; the narrow space being of uniform depth from rim to centre. A superheating chamber further characterized in that its baffle is provided with a central depression or depending projection which approaches or enters the upper end of the nozzle.

Ovens.—No. 314,701.

PARKINSON STOVE COMPANY, LTD., GIBB, D. M., and HICKINBOTTOM, F., all of Stechford.

No. 22,187; July 31, 1928.

This invention relates to cooking ovens of the kind in which both the burner, or burners, and the combustion products' outlet are arranged at or near the bottom of the oven.

The invention comprises the formation of the outlet passage in part by a removable false bottom which may advantageously be shaped as a tray, spaces being left at appropriate positions at the edges to allow the hot gases from the burner, or burners, to enter the oven and the products of combustion (after flowing through the oven) to pass out through the passage beneath the false bottom, and the supporting of the false bottom on a fixed bottom in part by an obliquely arranged partition or ledge which forms one side of a passage leading to the flue outlet or to a passage in one of the vertical sides or back of the oven opening into the flue outlet.

Gas Meter Diaphragms.—No. 314,888.

BINGHAM, J. H., of Dorney Common, and GLOVER, GEO., & CO., LTD., of Chelsea, S.W. 3.

No. 9904; April 2, 1928.

This invention relates to improvements in the means for supporting and guiding the diaphragm discs, and provides for a more even movement of the diaphragm.

According to the invention, in a gas meter of the kind comprising a diaphragm disc supported by an oscillatory arm having a sliding conection with the disc to allow the same to move to and fro along a straight axial path, a rocker bar is provided on the disc having a slot therein through which the said arm passes. To guide the disc in its movements, a stirrup is arranged with the bar thereof passing through slotted lugs on the disc; the ends of the stirrup being mounted to oscillate in fixed bearings in the meter casing.

"Connersville" Meters.—No. 315,030.

THE CONNERSVILLE BLOWER COMPANY, of Connersville, Indiana.

No. 11,818; April 21, 1928.

The object of the present invention is to produce a device which will automatically vary the connection between the positive displacement meter and the register in such manner as accurately (or closely approximately) to vary the movement of the register in accordance with the rate of flow of gas through the positive displacement meter, automatically to record the volume of slippage at all rates of movement of the positive displacement meter.

The invention consists of a positive displacement meter wherein the rate of movement of an element thereof varies with variations in differential pressure across the meter, a register, driving connections between the moving element of the meter and the register, and means dependent upon the rate of movement of the meter element to vary the effect of the driving connections on the register inversely with the rate of movement of the moving element of the meter.

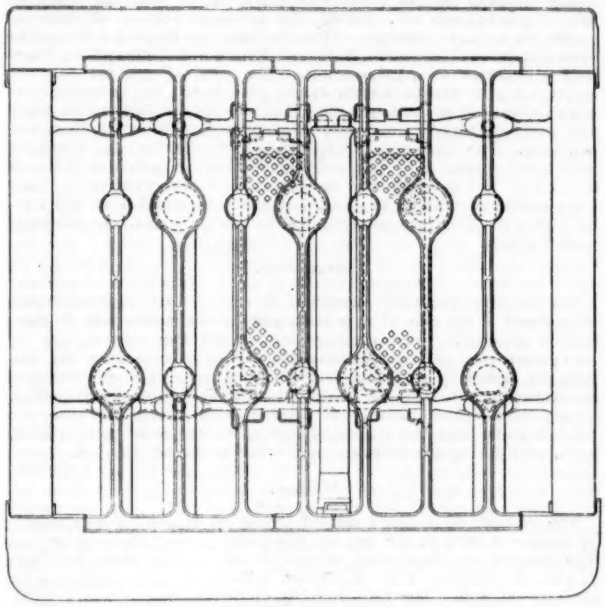
In order to adapt large volume meters of this type for use where there are intermittent periods of small demand, a small volume meter is so associated with the positive displacement large-volume meter and the register as to record the volumes of gas delivered through the meter structure during such low demand periods as will not efficiently actuate the large demand positive displacement meter. This smaller meter is generally of the diaphragm type where demands may drop close to zero. In cases where the small demand is for a fair volume, a properly designed small positive displacement meter may be used.

Cooker Hotplate Construction.—No. 315,129.

RADIATION LTD., of Birmingham, and YATES, H. J., of Grosvenor Place, S.W. 1.

No. 23,627; Aug. 16, 1928.

The object of the present invention is to combine adequate and improved pan stability, especially for small utensils, with good thermal efficiency and complete combustion of the gas on a cooker hotplate. The latter consists of an arrangement of transverse bars, each of which consists of a portion of narrow and relatively deep cross-section in combination with a thin plate for supporting a utensil; the plate being flush with the upper edge of the bar and being clear of obstruction at its underside. The invention also comprises the formation of the neighbouring bar, at the part adjacent to the plate above mentioned, with an enlargement of smaller size, a portion of the upper edge of the bar on opposite sides of this smaller plate or enlargement being recessed to form flame or ventilating spaces. Further, the invention comprises the formation of each bar with large and small pan supporting elements, and the arrangement of adjacent bars so that the smaller supporting elements lie alongside the larger ones.



Radiation's New Hotplate.

The accompanying diagram illustrates the method of construction.

Automatic Lighter for Hotplate Burners. No. 315,518.

MARKOVITCH, G., of Montreal.

No. 14,827; May 21, 1928.

The following claims are made for this invention:

1. A lighting device for burners of stoves or the like in which a lighter, controlled by a lighter valve and adapted to be operated automatically during the opening movement of one or more burner control valves so as to enlarge the lighter jets for igniting the burner or burners, is provided with means for automatically locking the lighter valve in its full open position.

2. A lighting device in which the means for automatically locking the lighter valve in its full open position are operated on initial full opening of a burner valve or valves.

3. A lighting device in which means are provided for releasing the lighter valve locking means upon partial repeated movement of the burner valve or valves.

4. A lighting device in which a transversely extending arm is secured to and rotatable with the lighter valve stem; the arm engaging with a pair of jaw members resiliently urged together for automatically closing the lighter valve.

5. A lighting device in which the means for locking the lighter valve in a full open position consists of grooves or notches formed intermediate the ends of the jaws; rollers mounted on the transverse arm being adapted to engage within the grooves or notches.

6. A lighting device in which the releasing means consist of cam members secured to the lighter valve stem, each of the cam members being provided with a plurality of pairs of diametrically opposed peripheral recesses for the engagement therewith of a spring pressed pawl carried by a rotatable lever actuated by one of the burner valves; each rotatable lever spring pressed pawl and cam being operated from its corresponding burner.

MISCELLANEOUS NEWS.

LEEDS GAS DEPARTMENT REPORT.

Increase of Industrial Appliances.

The gross revenue of the Leeds Corporation Gas Department for the year ended March 31 last amounted to £750,482, and the expenditure to £565,616, leaving a gross profit of £184,866. Out of this the Committee had to pay £24,212 in respect of income-tax, £156,652 in loan charges and bank interest, and £7738 in contributions to capital. A deficit of £3736 was left on the year's working.

The quantity of coal carbonized, including the equivalent of oil used, during the year was 221,438 tons, as compared with 231,185 tons for the previous year, a decrease of 9747 tons. The average cost per ton was 17s. 8d. as against 19s. 8d., a decrease of 10·17 p.ct. over the year ended March 31, 1928.

The quantity of gas made was 3,371,644,000 c.ft., as compared with 3,394,213,000 c.ft. during the previous year—a decrease of 22,689,000 c.ft., or 0·66 p.ct. This includes 332,864,000 c.ft. of coke oven gas received from the Middleton Estate and Colliery Co., which was a decrease of 4,378,000 c.ft. The yield of gas per ton was 15,226 c.ft., as compared with 14,682 c.ft. during the preceding year—an increase of 544 c.ft. per ton. The quantity of carburetted water gas produced was 273 millions, as compared with 272 million c.ft. last year. The total quantity sold was 3,192,957,000 c.ft., compared with 3,196,797,000 c.ft. last year—a decrease of 3,840,000 c.ft., or 0·12 p.ct. The quantity sold per ton of coal carbonized was 14,419 c.ft., compared with 13,827 c.ft. last year—an increase of 592 c.ft., or 4·28 p.ct. The gas unaccounted for was 5·9 p.ct., as compared with 6·4 p.ct.

RESIDUALS.

The quantity produced amounted to 91,013 tons, compared with 92,344 tons, a decrease of 1331 tons, and the net income was £66,693 against £70,041. The average price obtained was 17s. 11d. per ton as against 18s. 9d. the previous year. The income from tar was £29,405 against £35,810, a decrease of £6405. The quantity produced was 12,150 tons, as compared with 11,737 tons—an increase of 413 tons. The quantity of benzole sold during the year was 202,828 galls. and the income £15,894, as compared with 214,687 galls. sold during the previous year which produced £13,322.

METERS.

The number of ordinary meters in use on March 31 was 60,904, as compared with 61,828 for the preceding year—a decrease of 924. The number of prepayment meters in use on the same date was 74,780, as compared with 72,318—an increase of 2462, making a net increase of 1538. The total number of meters in use was 135,684. During the year 11,586 meters have been repaired.

APPLIANCES.

The number of cookers sold was 1040, value £4165, and on hire purchase 1471, value £7971.

During the year there has been a very steady demand for heating appliances; 1296 have been sold outright, realizing £2350, while 1319 have been supplied on the three years' hire-purchase system, the value being £2378.

It was also decided during the year to abolish the simple hire system for gas appliances and to substitute the three or five years' method of hire purchase.

There has been a regular demand for furnaces and apparatus for industrial work, the number of appliances sold being 459 against 185 the previous year. The number of bakers, confectioners, and fish fryers using gas has been greatly extended, while the total number of consumers on special furnace rate is 899, against 845 the previous year. Many of these appliances have only been fixed during the latter part of the year, and the consumption of gas has increased by approximately 29 million c.ft., or 11 p.ct.

The demonstration room at Dewsbury Road has been frequently used by engineers, &c., for the heat treatment of motor car and engine parts, and is much appreciated by prospective customers. With an improvement in trade a further increase in gas consumption can be looked for in this Department.

The number of water heaters sold was 614, value £1257, against 710 the previous year. These include circulators, geysers, and washboilers. The number taken on hire purchase was 667, value £1588, against 601 last year. The number of gas engines in use at the end of the year was 299, as compared with 329 the previous year.

During the year, 45,422 yds. of new mains have been laid in the City for the supply of gas to new streets, and 7718 yds. laid in place of smaller and defective mains varying in size from 2 in. to 14. in. diameter, the total being 30 miles 340 yds., as against 28 miles 1144 yds. last year.

The total length of mains in our area of supply is now 1160 miles, which is the greatest mileage in the kingdom except London, Glasgow, Birmingham, and Newcastle.

PRICE OF GAS.

The price of gas was reduced from the last meter reading in March, 1928, to 3s. 9d. per 1000 c.ft., or 9·57d. per therm. The average price received, after providing for discount and leakages, was 3s. 6·28d. per 1000 c.ft.

During the year the lighting of the roads has been extended to the City Boundary at Alwoodley and Dewsbury Road. The total number of lamps in the City is 18,886, of which 17,889 are gas and 997 electric. During the year, 513 additional lamps have been erected in various parts of the City, including 144 taken over in the Halton area, and a further 3051 clock controllers have been fitted to existing lamps, of which 2425 were in place of the wave pressure type. The total number of lamps now lighted and extinguished automatically is 14,956.

PURCHASE OF EAST KENT GAS UNDERTAKINGS.

Deal Shareholders Oppose Proposals.

In a recent speech [see "JOURNAL" for July 17, p. 147] Mr. R. Tilden Smith announced among the proposals for the development of the interests of Tilmanstone Collieries, Ltd., the installation of a low-temperature carbonization plant for the treatment of part of the output of Tilmanstone Colliery, and that, with a view to the utilization of the gas manufactured, a controlling interest was being sought in the East Kent Gas Company and in other gas undertakings in East Kent.

Among the undertakings in question is the Deal and Walmer Gas Company, and a proposal has been made for the acquisition of the ordinary capital stock in that Company (but not debentures or preference stock) conditional on not less than £59,100 of ordinary stock being acquired by Tilmanstone (Kent) Collieries, Ltd. The Directors of the Gas Company regard the terms offered by the proposed purchasers as very favourable, and the offer is now before the shareholders. The proposed purchasers offer £134 6s. 8d. per £100 stock, and by way of compensation to the Directors of the Deal and Walmer Gas Company, who, under the terms of the agreement, are to resign their office as such, a payment of £1000 is to be made to each Director. For a period of three years the purchasers are to retain the whole of the staff at present employed by the Company on terms as regards salaries, pensions, retiring allowances, &c., not less favourable than those existing on Dec. 31 last. A contribution of 13s. 4d. per £100 stock is to be made towards the vendors' costs of the agreement and negotiations therefor. The date for completion of the proposed purchase is fixed for Aug. 30 next.

It rests with the holders of ordinary stock in the Gas Company to decide whether they will accept the offer made to them; and in the absence of a meeting of stockholders called by the Directors, a meeting was called by Mr. J. G. Tooms, M.Inst.C.E., who as a gas engineer and administrator, and a stockholder, is opposed to the proposals in question.

SPECIAL MEETING OF STOCKHOLDERS.

The special meeting of the stockholders was held on Aug. 1 at the Clarendon Hotel, and was attended by forty-five of the shareholders of the Company, including two Directors. Mr. Tooms was elected Chairman of the meeting and Mr. Clapham Secretary.

After an opening speech by the Chairman, which traversed the Directors' policy and actions during the past four years with reference to the negotiations for the sale of the undertaking and the lack of confidence and faith in the concern, and emphasized very strongly the point that the proposed change would not be in the interests of the shareholders, or the gas consumers, or the ratepayers of Deal, a discussion took place, all the speakers being against the ratification of the agreement, with the exception of one of the Company's Directors and the Company's Consulting Engineer.

The following resolutions were put and carried *nem. con.*:

1.—That this meeting of stockholders of the Deal and Walmer Gas Company in meeting assembled on Aug. 1, 1929, at Deal, having discussed and considered the Deal and Walmer Gas Company's Directors' circular of July 25, are of opinion that the offer to purchase stock at £134 6s. 8d. per £100 stock subject to certain adjustments is inadequate and that the terms of agreement are unacceptable, and recommend all stockholders not to ratify the agreement of July 16, 1929, referred to in the Directors' circular of July 25.

2.—That the stockholders present at this meeting resolve that an extraordinary meeting of the Deal and Walmer Gas Company be called, and that the Committee be instructed to give effect to this resolution.

3.—That this meeting of stockholders hereby appoints the following: Messrs J. G. Tooms, Dyke, and Newing to act as their representatives, with power to confer with the Directors, and generally to watch the stockholders' interests, and make such recommendations to stockholders as they consider advisable.

4.—That this meeting instructs the Committee appointed to circularize the whole of the stockholders of the results of this meeting, and requests them not to ratify the agreement.

After resolution No. 4 was put, a letter was dispatched to the Secretary of the Gas Company demanding that an extraordinary general meeting of the stockholders of the Company be called at the earliest possible legal date.

A hearty vote of thanks to the Chairman closed the meeting.

Meter Testing at Bristol.—According to the report of the City Examiner, Mr. H. W. Harding, for the last quarter, of the 2662 meters examined and tested during the quarter, 2287 were correct and 375 incorrect within the provisions of the Gas Regulation Act. The number of incorrect meters registering in favour of the seller was 110, and in favour of the consumer 129. The number passing gas without registration was 135.

THE "METRO" COKE FIRE.

"Daily Mail" Amateur Advertisement Writers' Competition.

From time to time the "Daily Mail" organize a competition for all readers who are not professional advertisement writers; the prizes offered in each competition having a total value of £100. Four prizes of £25 were offered by the "Daily Mail" on Aug. 5; and one of the four subjects was the "Metro" coke grate manufactured by Messrs. Sidney Flavel & Co., Ltd., of Leamington. This should give good publicity to what the firm not unnaturally hope will become the solid fuel open fire of the future.

The "Metro" coke grate, which has been fully described in the "JOURNAL," is smokeless, is lighted with a gas burner at less cost than paper and wood, and costs about 4d. to 5d. a day at current coke prices. It was first developed by the South Metropolitan Gas Company, who carried out a lengthy series of experiments and tests; and though only put on the market by Messrs. Sidney Flavel last year, thousands have already been sold. The firm look forward to increased demands this winter, when its advantages become more widely known. The "Metro" grate is undoubtedly an effective means of overcoming the smoke nuisance, quite apart from the saving effected in running costs compared with the use of coal.

PUBLIC LIGHTING BY GAS IN LIVERPOOL.

Lighting Engineer's Annual Report.

The report on the work of the City of Liverpool Lighting Department for the year ended March 31 last shows that the total length of roads lighted amounts to 622½ miles, of which 445⅝ miles are lighted by gas, as compared with 449⅞ miles the previous year.

From the figures given, it is seen that 1211 additional electric lamps have been fixed, and the gas lamps have been discontinued, the net increase being 1051.

In spite of the fact that there is a further reduction in the number of lamps, the gas lighting of the city has nevertheless considerably improved. The work of substituting 4-light lamps in lieu of 2-light has been continued, 458 lamps having been dealt with in a number of important thoroughfares. In addition, the work of fixing 2-light in lieu of 1-light lamps has been continued, but on a larger scale, 1738 lamps having been converted.

A re-arrangement of the lighting in several adopted roads and passages has taken place, and in consequence one 4-light, twenty-three 2-light, and nineteen 1-light lamps have been installed, while in unadopted streets and passages, one 2-light and twenty-seven 1-light lamps have been erected, at the expense of the abutting property owners. Though, therefore, the number of lamps has decreased, the number of burners has grown from 22,034 to 24,373—an increase of 2339.

On April 1 last, the area of Croxteth was taken over by the Corporation, thus adding 14¾ miles of road to the city, excluding the Norris Green Housing Estate.

GAS METER TESTING.

The number of meters tested has decreased considerably from the record figure of last year, 35,518 meters only having been dealt with, as against 47,197 the previous year.

This was expected, as the housing operations have been considerably curtailed, and the number of meters required for new houses has, therefore, shown a considerable decline. In addition to this, the number of meters manufactured by Liverpool firms and tested at the Liverpool Station has fallen considerably, as in many of their contracts it is stipulated that the meters must be tested in the towns from which the contract is issued. The station has suffered considerably on this account.

The following statement gives the usual details, from which it will be noted that 1270, or 3·5 p.ct., were rejected, and that 24,273, or 68 p.ct., were of the prepayment type.

Senders.	Dry Meters.		Wet Meters.		Prepayment Meters.		Total.	Fees.
	Approved	Rejected.	Approved	Rejected.	Approved	Rejected.		
								£ s. d.
Liverpool Gas Company .	897	36	6678	53	4,854	332	12,850	759 1 0
Meter manufacturers, &c.	2802	97	284	38	18,060	533	21,814	1266 2 6
Local authorities . . .	76	13	2	..	421	18	530	28 2 0
Sundries . .	83	130	43	13	48	7	324	24 15 0
Totals . .	3858	276	7007	104	23,383	890	35,518	£2078 0 6

The following details as to the reason for rejection may be of interest:

Incorrect registration	683
Passing gas without registering.	116
Internal leakage	157
External leakage	110
Excessive absorption of pressure	89
Will not pass gas	66
Defective markings	36
Defective index	11
Rusty cases.	2
	1270

Owing to the smaller number of meters being tested, the opportunity has been taken of thoroughly overhauling the testing apparatus at both the Hood Street and Mill Lane Stations, and in addition two new 10 c.ft. holders have been installed at Hood Street.

EXPENDITURE.

The gross expenditure of the Department for the twelve months amounted to £123,368, and a revenue of £14,060 has been derived principally from work performed for, and material supplied to, other Departments and Committees, making the net expenditure on public lighting £109,309, representing a rate of approximately 4¼d. in the £.

PARKINSON & COWAN, LTD.

Annual General Meeting.

The Twenty-ninth Annual Ordinary General Meeting of Parkinson & Cowan, Ltd., was held on Wednesday, July 24, at the Company's Registered Office, 7/17, Fitzalan Street, Kennington Road, London, S.E., Sir HENRY COWAN, Chairman of the Company, presiding.

The report and statement of accounts having been taken as read, the CHAIRMAN said: The year to which the present accounts apply has been in many respects a difficult one, for the country is still feeling the effects of the war, and of the immense amount of unemployment directly or indirectly resulting from it. It is therefore the more satisfactory that we are able again to recommend a final dividend of 7½ p.ct., which, together with the 2½ p.ct. paid as interim dividend on Dec. 31 last, represents 10 p.ct. for the year. If our recommendations are adopted, there remains a disposable balance of £46,929, out of which £18,000 will be carried to reserve fund (bringing that fund up to £135,000) and £28,929 will be carried to next account.

I shall now refer to the main features in the balance-sheet, comparing them with those of the previous year. On the assets side, the item "Land and Buildings, £123,279," is up by £2739. During the year to which the accounts apply we have sold and vacated premises in Edinburgh, which had been occupied by one of our Companies for a period of over eighty years. We have applied the proceeds of this sale towards the purchase of a factory in London for one of our other subsidiaries—Domestic Electrification, Ltd. Otherwise the increase in the item, Land and Buildings, would have been greater. The surrender value of the sinking fund policy is up by £716, due to normal accretion of the surrender value. Our investments in subsidiary and associated companies are up by £112,542, which is due to the growing requirements of certain of these companies, in anticipation of which, you will remember, £150,000 of additional capital was raised last year. Our general investments are down by £423, a small investment having been sold at a profit during the year. The item, "Subsidiary and Associated Companies, Debit Balances," is up by £3359. The item of cash, appearing at £89,522, though up by £55,809, will, in the near future, be substantially reduced, owing to the requirements of certain of our subsidiaries.

Turning now to the liabilities side of the balance-sheet, you will notice that the issued capital, as at March 31 last, is up by £150,000, representing the shares issued in July, 1928—viz., 50,000 £1 preference and 100,000 £1 ordinary. The loan capital now consists of £191,500 first charge 6 p.ct. debenture stock, which is being gradually reduced in terms of the issue, the amount of £8500 having been redeemed up to March 31 last. This sum appears in the balance-sheet under the head of "Special Reserve Fund." As to the item, "Unpaid Interest and Dividends, £14,716 14s. 5d.," this sum, with the exception of £14 8s. 7d. for unclaimed dividends, represents the amount of debenture interest and preference dividend for which warrants were posted on the day of closing the books.

The home trade has been quiet during the whole period to which these accounts apply. We have no doubt done our share of such trade as was to be done. So far as the gas meter industry is concerned, we have no cause to apologize for the results of the year's working, though competition has been keen and conditions difficult.

On the gas meter side of the business we have recently produced and patented two novel types of meter designed with particular reference to the requirements of the home and overseas markets. We anticipate a considerable extension of business from the introduction of these meters. In this connection, I may remind you that, unlike many other large industrial concerns, this Company has a Board of Directors, each of whom is an expert in one or other of the many spheres of its activities or in the businesses carried on by its subsidiaries.

The Chairman then moved the following resolution (seconded by Mr. A. NORTON):

> "That the Report of the Directors and the Accounts for the year ended March 31, 1929, with the Auditor's report thereon, be received and adopted."

On the motion of the CHAIRMAN, seconded by Mr. A. E. HAYES, it was unanimously resolved:

> "That there be paid on 31st inst. a final dividend on old ordinary shares for the year of 7½ p.ct.—making with the interim dividend a total dividend for the year of 10 p.ct.—and a like proportionate dividend on the instalments paid up per share of the issue of July 10, 1928 (*less* income-tax), £32,090 12s. 4d. That there be carried to reserve fund £18,000, and that there be carried to next account £28,929 15s. 5d."

Mr. A. J. WEST proposed a hearty vote of thanks to the Chairman, the Directors, and the members of the Staff, which Mr. A. E. HAYES seconded.

GAS UNDERTAKINGS ACT ORDERS.

SECTION 6.

Ashford Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1, 1930, give notice of the calorific value of the gas they intend to supply.

Barnoldswick Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1, 1930, give notice of the calorific value of the gas they intend to supply.

Clay Cross Gas Company, Ltd.

The Company shall, from Jan. 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Oct. 1, 1929, give notice of the calorific value of the gas they intend to supply.

Gourock Corporation.

The Corporation shall, from March 31, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Dec. 31, 1929, give notice of the calorific value of the gas they intend to supply.

Meltham Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1, 1930, give notice of the calorific value of the gas they intend to supply.

Monifieth Corporation.

The Corporation shall, from March 31, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Dec. 31, 1929, give notice of the calorific value of the gas they intend to supply.

GAS SERVICE IN READING.

"Comfort in the Home."

The Reading Gas Company have published a booklet bearing the title "Comfort in the Home." It explains the modern ideals in gas cooking, lighting, and heating, and refers specially to the facilities available to gas users in Reading. The following figures, which are extracted from the booklet, show the growth of the Company's business during the past twenty-six years:

—	1902.	1928.
Number of consumers	6,851	25,973
Sale of gas	400,000,000 c.ft.	1,220,000,000 c.ft.
Cooking stoves and gas fires on hire	1,489	34,914
Mileage of mains	66	163½

READING GAS COMPANY'S STOCK AS AN INVESTMENT.

In view of the continued progress of the Company and the fact that since its incorporation nearly seventy years ago maximum dividends have been regularly paid—even during the difficult post-war period—the Company's stocks and shares have always been regarded locally as "gilt-edged" securities. It is not surprising, therefore, that issues of additional capital have invariably been over-subscribed.

The authorized amount of stock and share capital is £538,098, of which £368,095 has been issued. The latter figure includes no less than £30,357 premium capital which is not subject to dividend. The loan capital authorized is £269,049, and issued £184,041. The issue of loan capital is limited to one-half of the stock and share capital for the time being issued and paid up. The Company's capital charges are much below the average, which is obviously of great importance to both stockholders and consumers of gas. The reserve fund amounts to £53,811. This fund may be used to make up any deficiency in the prescribed dividends, but in the long history of the Company it has never been necessary to employ it for this purpose.

LARGER GAS SALES AT DUNFERMLINE.

An Increase in Price.

The report of the Engineer and Manager of the Dunfermline Gas Department for the year ended May 15 shows that the expenditure on revenue account amounted to £50,322, and the income to £70,873, giving a gross profit of £20,551. After allowing for payment of interest and sinking fund, income-tax, expenses of management of consolidated loans fund, and stamp duty on mortgages, and taking credit for unemployment relief grants, there is a credit balance of £723, which deducted from the debit balance brought in, leaves a balance of £3543 to be carried forward against the current year.

The coals carbonized during the year amounted to 20,148 tons 8 cwt., costing £17,215, an average of 17s. 1·06d. per ton. Contracts have been entered into for the supply of coal during the current year, at an average price of 17s. 10d. per ton delivered.

The quantity of gas made as per station meter amounted to 359,251,000 c.ft., a decrease of 1,111,000 c.ft., equal to 0·38 p.ct. The amount of gas sold, however, shows an increase of 3,324,200 c.ft. The average yield of gas per ton of coal was 17,830 c.ft. as per station meter, or 18,209 c.ft. corrected, of an average calorific value of 430·7 B.Th.U., equal to a production of 78·42 therms per ton.

RESIDUAL PRODUCTS.

The net income from residual products amounted to £12,213, equal to 12s. 1·48d. per ton of coal carbonized, or 70·49 p.ct. of the cost, making the net cost of coal 4s. 11·58d. per ton.

The year under review has been remarkable for the extraordinary fall in the value of tar, receipts from this source having fallen from £8758 in the previous year to £4207, a difference of £4551.

The agreement with the Inverkeithing Gas Company having expired, a new agreement has been entered into for a supply of gas in bulk over a period of 7 years from Jan. 1, 1929. During the year, the Department's premises in Canmore Street have been converted into a larger and well-equipped showroom, and the sale of gas apparatus since that date has been very satisfactory. A scheme for the hire purchase of all kinds of gas appliances has recently been introduced, with promising results. The Department now regularly advertises in the local newspapers, and the combined effects of these efforts should result in increased consumption of gas. Following the decreased consumption in the years 1927 and 1928, it is satisfactory to record an increase of 3,324,000 c.ft. for last year.

An increase in the price of coals, together with lower receipts from residuals and increased taxation, have necessitated an increase in the price of gas of 2d. per 1000 c.ft., making the price, as from Aug. 16, 3s. 2d. per 1000 c.ft., or 8·84d. per therm.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The shipping position is now greatly improved, and, with ample tonnage available, the prompt coal position is steady in practically all departments. Indeed, there is every prospect of strong markets up to the end of the year, as there is much inquiry, and the demand appears to be increasing, if anything. Beyond that, however, everything is at present in doubt, as by then it is expected that the selling schemes will be introduced, and business for next year is being held up. It is unfortunate, as no doubt much could be done now at quite good prices.

There has been quite a revival in Northumberland steams, and up to 16s. f.o.b. is being quoted for best screened sorts in some quarters. Gas coals of the better qualities are in good demand, and Wear Specials are firm at 17s. 6d. f.o.b., with bests at 16s. 9d. Seconds are plentiful at 15s. 6d. to 15s. 9d. Coking coals are firmer again, and are quoted at 16s. 3d. to 16s. 6d. Durham bunkers are in good average demand; best makes being 16s. 6d. to 17s. 3d., with ordinaries at 15s. 6d. to 15s. 9d.

Gas coke is quiet; the shipment price being about 21s. 6d. f.o.b.

YORKSHIRE AND LANCASHIRE.

Gas coal in Yorkshire is in less demand, with the result that there is a considerable surplus on offer. The inquiry for most grades of industrial fuel is rather quieter, and values are about as follows:

Washed trebles, 18s.; washed doubles, 17s. 6d.; washed singles, 16s. 6d.; washed smalls, 15s. 6d. per ton f.o.b.

The output of good coking slacks is fully cleared; but rough slacks are in quieter request. Best hards and trebles for export show a reduction of about 6d. per ton compared with last week. Although inquiry on forward account is inactive, collieries are holding out for their quotations. Best hards are fairly well taken at 18s. per ton f.o.b. for prompt business. Secondary sorts are more freely offered, and prices are more competitive. Furnace coke remains firm at about 22s. per ton f.o.b.

In Lancashire, the coal trade generally has been very slow, and industrial fuel has been difficult to sell owing to the cotton dispute. Average prices in wagons at pits are:

Lancashire—Best house, 27s. to 29s.; seconds, 25s. to 27s.; kitchen, 18s. to 21s.; common, 16s. to 19s.

Yorkshire—Selected house, 31s. to 33s.; best house, 22s. to 24s.; seconds, 19s. to 21s.; washed doubles, 14s. to 15s. 6d.; washed singles, 13s. to 14s.; slack, 10s. to 12s. per ton.

MIDLANDS.

The coal trade is beginning to right itself after the holiday break. Very little coal was raised in the Midlands coalfields last week. Even where a start was made on Thursday or Friday, it was half-hearted. There was no pressure of demand to call for productive activity. The consuming works were idle for the most part, and were well stocked against resumption; householders were away, and merchants were quiet. The house trade may be expected to pick up now, and before August is out stocks will be replenished in many cellars. All the symptoms point to a hardening of values for the best grades, though so far no revised lists have been issued.

Outlets for all descriptions of smalls and slacks were closed for the week; but deliveries to public utility undertakings and factories are now resumed. Slacks are quite firm, under the influence of restricted production, and vary from 5s. 6d. to 7s. at pithead for the inferior qualities to from 9s. to 11s. for good nutty slacks. Warwickshire beans are worth from 12s. to 13s. There is a considerable scarcity of coke as a consequence of the relighting of additional furnaces on the North-East Coast, and prices are accordingly hardening. Few additions have been made to Midland furnaces in commission.

CONTRACTS OPEN.

Pipes and Pipe Laying.

Tenders are invited for steel and cast iron mains and laying same for the Dover Gas Company. [See advert. on p. 371.]

TRADE NOTES.

The Semet-Solvay and Piette Coke Oven Company, Ltd., inform us that the name of the Company has now been changed to "Chemicals and Coke Company, Ltd.," with the registered office at Howard Chambers, 155, Norfolk Street, Sheffield, as before. Telegraphic address, "Chemunion." An office has been opened at Vintry House, Queen Street Place, London, E.C. 4.

Gasholder Repairing by Electric-Arc Welding.

We are informed by Messrs. A. E. Plumstead & Co., Ltd., of Norwich, that those of our readers who are interested in the repairing of gasholders by the electric-arc welding process may visit the Hastings Gasholder Station at Queen's Road, by the kind invitation of the Engineer and General Manager, Mr. C. F. Botley, and view this class of work in progress.

Forgings.

Messrs. Steel, Peech, & Tozer, Ltd., of Sheffield, have published a folder dealing with their various forging work. Every type of forging work is undertaken by the Company, while their laboratory and testing equipment is an important feature of their service. Adequate facilities are provided for inspectors to attend and secure test pieces or to witness tests, in order to ensure that the product is perfectly sound and satisfactory.

New Plant for Blackburn.

The Blackburn Town Council, on Aug. 1, approved the following tenders for the supply and fixing of plant at Greenbank Gas-Works: Messrs. James Proctor (Burnley), mechanical stokers for four boilers; Superheat Furnace Company (Bradford), superheat furnaces for four boilers; Boiler Tube and Flue Cleaner Company (Glasgow), equipping four Lancashire boilers, economizer chamber, and main flue with "Vulcan" system of flue cleaning.

Croydon Gas Company.—At a meeting of the Directors of the Company held on Aug. 2, the following dividends were declared in respect of the half-year ended June 30 last: On the redeemable preference stock at the rate of 7½ p.ct. per annum; on the maximum dividend stock, at the rate of 5 p.ct. per annum; and on the sliding-scale stock, at the rate of 7 p.ct. per annum.

Primitiva Gas Company.—In connection with the offer to shareholders of the Primitiva Gas Company of Buenos Aires to exchange their shares for shares in Primitiva Holdings, it is announced that the response has been such that, excluding the large block of shares acquired by the Cia Hispano-Americana de Electricdad (C.H.A.D.E.), approximately 90 p.ct. of the shares in the Gas Company are now held by the Holdings Company.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 13.

There is a fair amount of interest in pitch, and the price is firm not below 45s. f.o.b.

Creosote for export is unchanged at 6¾d. per gallon f.o.b.

Pure toluole is in demand and scarce at about 2s. 2d. per gallon; 95/160 solvent naphtha is quiet at about 1s. 5d. per gallon; and pure benzole is about 1s. 11d.

Pyridine bases are 3s. 9d. to 4s. per gallon.

Tar Products in the Provinces.

Aug. 12.

The improvement in the market for pitch continues, and a fair amount of business has been done at 45s. f.o.b. There have been inquiries for delivery in the autumn of next year, which the producers have refused to consider.

Creosote.—There is no alteration in the market for this article; but there does not appear to be any great anxiety to sell.

Crude carbolic acid is still very firm, and 2s. 5d. is reported to have been paid for 60's carbolic for immediate delivery. Crystals are still being inquired for; but it is very difficult indeed to obtain any offer of natural crystals for prompt delivery.

Cresylic acid is still very dull.

Water-white products remain unchanged, with a good demand for pure toluole.

The average prices of gas-works products during the week were: Gas-works tar, 23s. to 28s. Pitch—East Coast, 45s. f.o.b. West Coast—(f.a.s.) Manchester, 39s. 6d. to 40s.; Liverpool, 43s. to 44s.; Clyde, 43s. to 44s. Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3¾d. to 1s. 4¼d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 2d. to 2¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 4d. to 2s. 5d. prompt. Naphthalene, £13 to £15. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

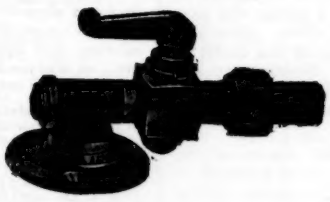
Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.		s. d.	
Crude benzole . . .	0 10	to	0 11	per gallon at works
Motor ,, . . .	1 5	,,	1 6	,, ,, ,,
90 p.ct. ,, . . .	1 7	,,	1 8	,, ,, ,,
Pure ,, . . .	1 10	,,	1 11	,, ,, ,,

IF WINTER COMES

This is what you will want.

Two-way  *Gas Fire Tap.*

Hadn't you better get them now?

Can be fitted with patent Locking device if desired.

SAWER & PURVES

BRANCH OF METERS, LTD.

MILES PLATTING,
MANCHESTER
Wires:
"Sawer, Manchester."
"Sawer, Nottingham."
"Metrique Lamb, London."

45 & 47, WESTMINSTER BRIDGE ROAD,
LONDON, S.E.1.

RADFORD ROAD,
NOTTINGHAM
Telephone Nos.:
3289 (City) Manchester.
75202 Nottingham.
2412 (Hop) London.

Burgh of Airdrie Gas Department.

During the past year the amount of gas made was 146,187,000 c.ft., as against 146,548,000 c.ft., a decrease of 361,000 c.ft., or 0·24 p.ct. The coal carbonized amounted to 9062 tons, compared with 9404 tons, a decrease of 342 tons on the previous year. There was also used in the manufacture of carburetted water gas 2034 galls. of oil, compared with 1956 galls. during the previous year—an increase of 78 galls. The yield of gas per ton of coal carbonized, including water gas from coke and oil, was 16,131 c.ft., as compared with 15,583 c.ft. during the previous year—an increase of 548 c.ft. The total quantity of gas sold was 137,280,500 c.ft., compared with 137,432,900 c.ft. for the preceding year—a decrease of 152,400 c.ft., or 0·11 p.ct. Both ordinary and prepayment meters showed an increase, while industrial meters consumed 11,622,800 c.ft., compared with 13,948,300 c.ft.—a decrease of 2,325,500 c.ft., or 16·67 p.ct. Public lamps consumed 9,730,500 c.ft., as against 9,570,500 c.ft. for the previous year—an increase of 160,000 c.ft., or 0·01 p.ct. The total income of the undertaking amounted to £36,631, as against £37,512 for the previous year, being a decrease of £881. The gross income from residuals and bye-products amounted to £4943, as against £5674 for the preceding year.

Proposed Price Reduction at Perth.—The accounts and estimates of the Perth Gas Department have been submitted to the Committee, and consumers are promised a reduction in price of 2d. per 1000 c.ft.

Increased Sales at Cupar.—The Directors' report submitted at the annual meeting of Cupar Gas Company showed a balance of credit of the profit and loss account of £1972, as compared with £1925 the previous year. The Chairman, Bailie Struth, stated there had been a considerable increase in the consumption of gas. Had it not been for the big reduction in the price of tar, the price of gas might have been reduced.

Bakewell to Boom Gas.—The Bakewell Urban District Council have decided to organize a gas exhibition for a week from Sept. 10. The Council feel that the benefits to be derived from using gas should be brought more prominently before the public in the Bakewell district, and they have engaged Miss Tuxford to give a series of demonstrations. There will be competitions for cooking and baking, and substantial prizes will be offered.

Lytham St. Annes Results.—The annual returns of Lytham St. Annes Council show a loss on the Gas Department of £1577. The income was £60,572, a decrease of £4600. Sales of gas brought in £46,820 (against £43,507), and residuals £12,665 (against £14,124). Expenses were £44,842 (against £45,732). The gross profit was £15,729, and there was a deficiency of £982. Last year the undertaking provided £2000 for rate relief. The reserve fund amounts to £10,671.

Gas Exhibit at Cardiff.—At the Royal Welsh Agricultural Show held at Cardiff during the three days Aug. 7 to 9, the Cardiff Gas Light and Coke Company had a stand in the line of trade exhibits facing the big ring. The Company made a special display of graded coke, sulphate of ammonia, prepared tar, gas appliances, including the patent dairymen's boiler, the latest high-level cooker (all enamelled), and other exhibits, including wash-boilers, latest geysers, and gas fires. There were experts in attendance only too willing to explain everything to callers. This was a "still" stand, with no working machinery, and was a credit to the Cardiff Gas Light and Coke Company.

Camborne Gas Company Report.—The Directors of the Camborne Gas Company, in their report for the year ended June 30, announce a steady increase in the business of the Company during the past year, the sale of gas having increased by over three-quarters of a million c.ft. The values of coke and tar have seriously declined during the past year, the receipts from residuals products being nearly £600 less than in the preceding year. The balance standing to the credit of profit and loss account amounting to £3339 the Directors recommend should be appropriated as follows: The declaration of a dividend at the rate of 6 p.ct. per annum (*less* income-tax), leaving to be carried to next account the sum of £2427.

Malton Gas Company Results.—The Directors' report on the working of the Malton Gas Company for the half-year ended June 30 last shows that the balance of net profit is £2279, against £2300 twelve months ago, a saving in the cost of coal being more than counterbalanced by the rise in local rates from £100 to £256 on the increased assessment made under the Rating Act of 1925, and by the reduced price obtained for tar. In the profit and loss account there is a balance of £2528 brought from the last account, and this amount is increased, by adding the net profit for the half-year, to £4380. The Directors recommend the payment of a dividend of 6½ p.ct. for the half-year, free of income-tax, which will absorb £1560, and leave £2820 to be carried forward to the next account.

Weymouth Gas Company Results.—The sales of gas by the Weymouth Consumers' Gas Company again show an increase, the amount sold for the half-year being 568,364 therms, or 123,557,500 c.ft. This, compared with the corresponding period of last year, shows an increase of 10,966,700 c.ft., or 9·74 p.ct. The receipts from the sale of gas exceed those of a year ago by £2101. The Directors are pleased to state the Special Order for which they made application has received the sanction of Parliament, and they now await official confirmation by the Board of Trade. Immediately this is received, it is their intention to proceed with the laying of mains, &c., in order to give a supply of gas to Upwey and Broadwey. After providing for the interest on the debenture stock, the balance at the credit of the net revenue account is £19,330, out of which the Directors recommend the payment of a dividend on the ordinary stock for the half-year at the maximum rate of 5 p.ct. per annum, *less* income-tax.

Gas Profits in Ulster.

Small net profits are being reported by many of the gas concerns in Northern Ireland. At Omagh (Co. Tyrone) the net figure on the year to March 31 last is £52, as against £163 for the previous year, though the gross profit was as much as £2062. Payment of loan charges largely consumed the balance, and during the year the price has been reduced by 5d. per 1000 c.ft. Lurgan (Co. Armagh) had even smaller net profit (£42), and here again payment of interest and instalment of loans accounted for much of the gross profits, £4500 out of £4542. During the year 5,989,870 c.ft. of gas were sold, and the total income from the sale of gas and residuals was £17,913, a decrease of £2097, due to the reduction in the price of gas. In Ballymena, on the recommendation of the Manager (Mr. Surman), a reduction to come into operation in September has been approved, the prices to be: Quarterly meter consumers of 1000 to 10,000 c.ft., 5s. 7d., *less* 5 p.ct.; 10,000 to 50,000 c.ft., 7½ p.ct.; and 50,000 c.ft. and upwards, 20 p.ct., with flat rate of 5s. 7d. per 1000 c.ft. for slot meter consumers.

Cheaper Gas in Alyth.—The Directors of Alyth Gas Light Company have agreed to reduce the price of gas by 5d., making it now 5s. 5d. per 1000 c.ft.

Satisfactory Results at Montrose.—The ninth annual general meeting of Montrose Gas Company on July 24 was held in the Town Buildings, Mr. David Smith occupying the Chair. The annual report stated that the quantity of gas manufactured for the year amounted to 74,693,000 c.ft., being an increase on the previous year of 2,004,000 c.ft. In moving the adoption of the report, the Chairman said they were getting back to their old standard. They had increased their investments during the year by £2000 in War Stock. During the year they had been able to reduce the price of gas by 3d. per 1000 c.ft.

£5000 Main Scheme Held Up.—A scheme to extend the gas main from Ballymena (Co. Antrim) to a large industrial works at Cullybackey three miles distant, at an estimated cost of £5000, is held up temporarily because the sanction of the Government Department cannot be bestowed until the Department secures powers from the Ulster Parliament. Mr. Surman, the Gas Manager at Ballymena, has had a number of interviews with the Home Office officials. The Minister will introduce a Bill next session, but meantime Ballymena Council can do nothing. The Ministry exhausted every inquiry to see if they could not give a permit in interim, but found they could not do so.

West Bromwich Gas Department Report.—The report of the Gas Committee of the West Bromwich Town Council for the year ended March 31 shows that the total income for the year was £110,868, as compared with £112,904 the previous year, a decrease of £2036. The gross profit amounted to £14,492; and after payment of interest and sinking fund charges amounting to £11,802, there was a net profit of £2689, as compared with a net profit of £6096 the previous year. When the report was presented to the Council, Councillor T. Cottrell drew attention to the fact that there had been a greater loss from wastage during the past year than for any year, with one exception, in the last 39 years. He asked if the explanation was that they were making gas cheaper and wasted more. Alderman Cox (Chairman), in reply, said he did not think there had been an abnormal loss through leakages, but added that the cast-iron mains would not stand the heavy traffic on the roads.

Lighting and Heating Apparatus Companies' Re-Organization.—The opening month of the new lighting and heating season marks an event of considerable importance in the history of two old-established Companies engaged in the production and distribution of lighting and heating apparatus. The Welsbach Light Company, Ltd., of Gray's Inn Road, W.C. 1, who, as everybody knows, were the pioneers in the gas mantle industry, and Lighting Trades, Ltd., of 30/31, Farringdon Street, E.C. 4, are both controlled by Imperial Chemical Industries, Ltd., and the two businesses have now been concentrated at the address of Lighting Trades, Ltd. Readers are particularly requested to note this address, and are respectfully asked to send all future communications thereto. New stores have been built to accommodate the vast range of lighting and heating apparatus for gas, electricity, and oil, resulting from the concentration of stocks of two Companies of this size, and particular attention has been paid in the planning to facilitate rapid collection and despatching of goods.

The Year's Results at Maidstone.—The report of the Directors of the Maidstone Gas Company for the year ended June 30 states that the revenue account for the past year shows that after providing for all fixed charges, including £3800 for depreciation of stoves and fittings, there remains an available balance of £16,090, which, together with the balance of £13,384 brought forward from the previous year and £1108 earned on investments, makes a total of £31,482. After providing for income-tax, interest on debenture stock and deposits, and the interim dividend of 4 p.ct. paid on March 1 last, there remains a balance of £18,499, out of which the Directors recommend the payment of a final dividend of 4½ p.ct., making 8½ p.ct. for the year. The sales of gas show an increase of 91,929 therms, or 4·3 p.ct. over those of the previous year. The market for tar has suffered a serious fall during the last six months. A further reduced revenue from this source is anticipated during the next financial year. On the other hand, the price for coke has been fairly well maintained. To meet the increasing demand for gas, the Directors decided on an extension of the Company's No. 2 retort house, and it is hoped that the new plant will be operating in the coming autumn.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 9.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 7	5	5	Aldershot 5 p.c. max. C.	70—75	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	73—76	..	..
1,581,868	,,	Apl. 11	7½	7½	Alliance & Dublin Ord.	96—99	..	..
374,000	,,	July 11	4	4	Do. 4 p.c. Deb.	62—65	..	..
522,555	,,	Mar. 7	7	7	Barnet Ord. 7 p.c.	115—118	..	..
300,000	1	May 9	1/4⅛	1/4⅛	Bombay, Ltd.	19/—21/-	..	..
172,500	10	Mar. 7	8½	9	Bournemouth 5 p.c.	13—13½	..	..
800,080	10	,,	7	7	Do. B 7 p.c.	12⅜—12¼	..	..
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10½—11½	..	11—11 3/16
50,000	Stk.	July 11	3	3	Do. 3 p.c. Deb.	54—57	..	54
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	72—75	..	73
857,900	,,	Mar. 21	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	..
371,880	,,	,,	6⅔	6⅔	Do. 5 p.c. Con.	100—103	..	..
1,287,500	,,	July 25	6	6	Bristol 5 p.c. max.	87½—88½a*	..	..
885,000	,,	Apl. 11	8	7½	British Ord.	117—120	..	..
100,000	,,	June 27	7	7	Do. 7 p.c. Pref.	112—117	..	..
150,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	71—74	..	..
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	94—97	..	..
100,000	10	May 30	6	8	Cape Town, Ltd.	9—10	+⅛	9½
150,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	..
150,000	Stk.	June 27	4½	4½	Do. 4½ p.c. Deb.	71—76	..	..
636,860	,,	July 25	6	6	Cardiff Con. Ord.	95—98*	..	..
187,880	,,	June 27	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
157,150	,,	Feb. 21	5	6⅔	Chester 5 p.c. Ord.	88—93b	..	..
98,936	1	May 9	1/2/-	1/2/-	Colombo Ltd. Ord.	35/—37/-	..	..
24,495	1	,,	1/4⅝	1/4⅝	Do. 7 p.c. Pref.	20/—22/-	..	..
375,402	1	Apl. 11	1/9⅜	1/9⅜	Colonial Gas Assn. Ld. Ord.	24/6—26/6	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/6—22.6	..	..
2,073,280	Stk.	July 25	7	5	Commercial Ord.	93—96*	—1	94
475,000	,,	June 13	3	3	Do. 3 p.c. Deb.	56—59	..	..
787,550	,,	Feb. 21	7	7	Croydon sliding scale	110—113	..	110
408,100	,,	,,	5	5	Do. max. div.	83—86	..	83½
542,270	,,	Mar. 7	7	10	Derby Con.	112—117e	..	..
55,000	,,	June 27	4	4	Do. Deb.	68—71e	..	..
209,000	,,	Mar. 7	5	5	East Hull Ord. 5 p.c.	73—75	..	..
1,003,180	10	Mar. 21	†4	†7	European, Ltd.	16—18	..	15⅞—17
18,708,480	Stk.	July 25	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	18/7½—19/1½f*	—/1½	18/7½—19/-
2,600,000	,,	,,	8¾	8¾	Do. 8½ p.c. max.	61—63*	..	61—62½
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	74—76*	..	74½—75
5,668,620	,,	June 13	3	3	Do. 3 p.c. Con. Deb.	57—60	—1	f74—58
3,643,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	97—100	..	99—99½
82,500	,,	Mar. 21	7	7	Hastings & St L. 5 p.c. Conv	98—103	..	..
266,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	80—85	..	..
70,000	10	Apl. 24	†10	†10	Hongkong & China, Ltd.	14—16	..	..
218,200	Stk.	Mar. 7	5½	6	Hornsey Con. 3½ p.c.	86—89	..	86½
1,976,000	,,	May 30	10	20	Imperial Continental Cap.	365—385	+10	359—376
228,180	,,	Feb. 7	3½	3½	Do. 3½ p.c. Red. Deb.	70—73	..	..
225,242	,,	Mar. 7	7½	8	Lea Bridge 5 p.c. Ord.	117—120	..	..
2,145,907	,,	Feb. 21	6½	6½	Liverpool 5 p.c. Ord.	95—96b	..	..
600,000	,,	Mar. 21	7	7	Do. 7 p.c. Red. Pref.	102—104b	..	..
165,756	,,	Feb. 21	9	8	Maidstone 5 p.c. Cap.	124—129	..	125
53,480	,,	June 27	3	3	Do. 3 p.c. Deb.	53—56	..	..
75,000	5	June 13	†8	†10	Malta & Mediterranean	5½—6	..	..
392,000	—	Apl. 2	—	5½	Metrop't'n (of Melbourne) 5½ p.c. Red. Deb.	100—102	..	..
841,220	Stk.	May 30	†5	†9	Montevideo, Ltd.	105—108	..	106½—107
2,031,315	,,	July 25	5	5½	Newcastle & Gateshead Con.	16/3—16/9d/	—/3	..
662,856	,,	,,	4	4	Do. 4 p.c. Pref.	70½—71½d	..	..
491,705	,,	June 27	8½	8½	Do. 8½ p.c. Deb.	68—69d	..	..
181,760	,,	Mar. 7	7/1/0	7/1/0	North Middlesex 6 p.c. Con.	105—110	..	..
800,000	,,	Apl. 24	9	7	Oriental, Ltd.	115—120	..	118½—119½
205,162	,,	June 27	8	8	Plym'th & Stonehouse 5 p.c.	110—113	..	..
424,416	,,	Feb. 21	7½	8½	Portsm'th Con. Stk. 4 p.c. Std.	113—118	..	..
341,446	,,	,,	5	5	Do. 5 p.c. max.	82—85	..	..
2,334,464	1	June 27	—	‡5	Primitiva Ord.	34/6—36/6	..	34/6—35/9
244,500	100	June 3	4	4	Do. 4 p.c. Red. Deb.	92—95	..	..
695,000	Stk.	July 25	4	4	Do. 4 p.c. Red. Deb. 1911	79—82*	..	81½—82
418,845	,,	June 27	4	4	Do. 4 p.c. Cons. Deb.	79—82	..	81½—82
150,000	10	Mar. 21	6	6	San Paulo 6 p.c. Pref.	8½—9	..	..
1,736,968	Stk.	Mar. 21	6½	6½	Sheffield Cons.	108—110a	..	..
95,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	74—77e	..	..
90,000	10	June 13	‡4	‡4	South African	4—6	..	..
6,909,893	Stk.	July 26	7½	6	South Met. Ord.	101—103*	—1	101—102½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	106—107*	..	106½
1,895,445	,,	July 11	8	8	Do. 8 p.c. Deb.	57—60*	..	..
784,000	,,	Mar. 7	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	..
91,500	,,	Mar. 7	8½	8½	South Shields Con.	105½—107½d	..	..
1,543,795	,,	July 25	6½	6½	South Suburban Ord. 6 p.c.	103—106*	..	104½—105½
468,887	,,	June 27	5	5	Do. 5 p.c. Deb.	95—98	..	96—97½
647,740	,,	Mar. 7	5	5	South'mpton Ord. 5 p.c. max	77—80	..	..
191,278	,,	June 27	4	4	Do. 4 p.c. Deb.	70—73	..	..
179,014	,,	July 25	8	8	Sutton Ord.	115—118*	+2	116—117
350,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
200,000	,,	June 27	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
1,002,275	,,	Mar. 7	—	6⅔	Tottenham District Ord.	105—108	—1	107—107½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
191,255	,,	June 13	4	4	Do. 4 p.c. Deb.	74—77	..	..
339,094	,,	Mar. 7	5⅓	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	93—98	..	..
88,320	,,	,,	5	5	Do. 5 p.c. pref.	88—93	..	..
80,000	,,	July 11	9	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	144—147*	..	..
255,885	,,	,,	7½	7½	Do. B 5½ p.c.	122—127*	..	..
432,585	,,	,,	6 3/10	6 3/10	Do. C and New	100—105*	..	103—103½
352,000	,,	,,	7½	7½	Do. Wimbledon 5 p.c.	112—117*	..	..
98,000	,,	,,	7⅝	7⅝	Do. Epsom 5 p.c.	123—128*	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	87—92*	..	..
88,416	,,	June 27	3	3	Do. 3 p.c. Deb.	54—57	..	..
284,742	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	75
207,500	,,	,,	5	5	Do. 5 p.c. Deb.	93—96	..	..

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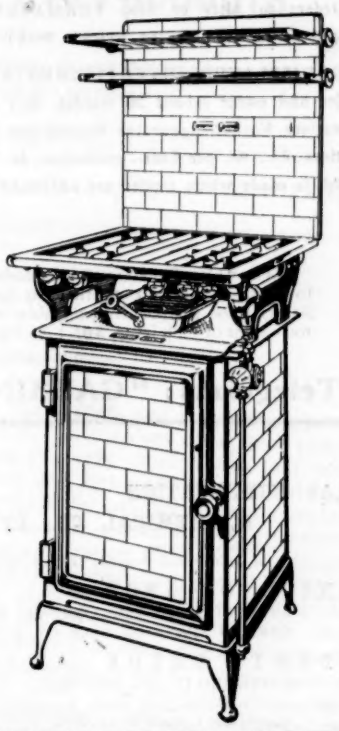

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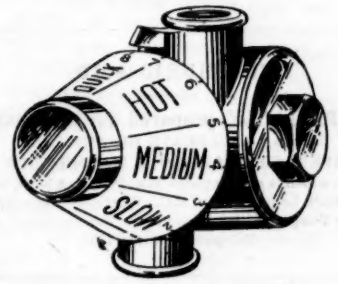

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